





*With the compliments of the
U.S. Hydrographic Office.*

Commodore R.L. Wyman, U.S.N.

Hydrographer
*to the Bureau of Navigation,
Washington, D.C.*



No. 60.

U. S. HYDROGRAPHIC OFFICE, BUREAU OF NAVIGATION

COASTS AND PORTS

OF THE

BAY OF BISCAY.

COMPILED AT THE

UNITED STATES HYDROGRAPHIC OFFICE

BY

LIEUTENANTS GEORGE M. TOTTEN AND SEATON SCHROEDER,

UNITED STATES NAVY.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1876.

ADVERTISEMENT.

THE NORTH COAST OF SPAIN, containing a detail description of the coast from Cape Ortegal to the Bidasoa River, has been compiled from the *Derrotero de la Costa Septentrional de España*, by Don Pedro Riudavets y Turdury; the *Sailing Directions, West Coasts of France, Spain, and Portugal*, by Staff Commander James Penn, R. N., together with the most recent charts and notices published. Extracts have been taken from the latest British consular reports; Urquhart's *Dues and Charges on Shipping in Foreign Ports*; the *American Encyclopædia*; the *Encyclopædia Britannica*; the *British Commercial Dictionary*; the *Imperial Gazetteer*, and such other works of travel as were available.

THE WEST COAST OF FRANCE, containing a detail description of the coast from the Bidasoa river to Melgorne point, has been compiled from the *Pilote des Côtes Ouest de la France*, by A. Bouquet de la Grye; the *Pilote de la Manche, Côtes Nord de France*, by Captain Thomassin, of the French Navy; the *Derrotero de la Costa Occidental de Francia, &c.*, by Don Gonzalo de Murga; the *Sailing Directions, West Coasts of France, Spain, and Portugal*, by Staff Commander James Penn, R. N., together with the most recent charts and notices published. Extracts have been taken from the latest United States and British consular reports; the *Répertoire de Législation, &c.*, by D. Dalloz, Sr.; the *Atterrage de Brest*, by Captain H. de Roujoux, of the French navy; Urquhart's *Dues and Charges on Shipping in Foreign Ports*; the *American Encyclopædia*, the *Encyclopædia Britannica*, and such other works as were available.

R. H. W.

U. S. HYDROGRAPHIC OFFICE,

Washington, D. C., February 10, 1876.

NOTE.

The courses, bearings, and trend of the land are *true* unless otherwise mentioned.

The direction of the winds, as given, is the point from which they blow ; and of the currents, the point toward which they set.

Distances are given in geographical miles and cable-lengths ; the latter are assumed to be 100 fathoms.

TABLE OF CONTENTS.

CHAPTER I.

FROM CAPE ORTEGAL TO RIVADEO INLET.

	Page.
Introduction; bay of Biscay; winds; currents; soundings; route.....	3-7
Cape Ortegal; islets and rocks; coast; Cariño inlet; port Santa Marta; tides; Espasante bay and village; Bandeja point; Piedras Meas rocks; caution; winds; currents	7-11
Estaca point; Los Siguelos; light; cape Vares; Barquero inlet; Vares bay; anchorages; Sobrepuesta and Santo points; port Barquero; Sor river; mount Furado; Puerto de Vale; Cueva Baja point; Conejera island, channel, light; advantages; water; tides; directions; land and sea breezes; pilots; coast..	11-18
Socastro point; port Vivero; Gabeira islet; Caballo point; San Juan bay; Grallal beach; Vivero; Cillero; bar; mount Faro; resources; tides; directions; C6 bank; Lage bank; marks	18-22
Saiñas point; Netos islets; Anzaron island; cape Morás; San Cipriano bay; Paraños beach; Lieiro beach; San Cipriano beach; Farallones; San Clemente reefs; San Cipriano port and river; water; tides; light; directions; pilots	22-28
Leixon del Nordeste; Portelo; Somonte and Burela points; gulf of Foz; winds; fogs; currents; Chacineiras islets; Piedra de Burela; coast; Foz inlet; tides; coast	28-32

CHAPTER II.

FROM RIVADEO INLET TO CAPE PEÑAS.

Pancha islet; light; Rivadeo inlet; town; Castropol; Carabela bank; Arnao bay; Cruz point; Arredo bank; Panchorro bank; soundings; tides; resources; pilots; directions	32-38
Province of Oviedo; Castro bank; Santa-Gadía point; cape San Sebastian; Tapia islet; Orrio de Tapia; light; Porcia bay; cape Blanco; port Viaveles; tides; resources; coast; cape San Agustin; Navia inlet; pilots; marks; coast	38-43
Port Vega; Romanellas rocks; coast; port Luarca; light; tides; dangers; directions; coast; cape Busto; light; Serron bank; Peton bank; coast; cape Bidio; San Pedro and Oteiro bays; Artedo bay; port Cudillero; light; coast	43-49
Pravia river; bar; port San Estéban; Forno anchorage; resources; tides; directions; Cogollo point; Deva islet; coast.....	49-52
Avilés inlet; bar; tides; light; town; resources; directions; dangers; currents; pilots; coast; cape Peñas; light; Erbosa isle; Merendálvarez reefs; Somoslungo bank; winds; currents; directions.....	52-59

CHAPTER III.

FROM CAPE PEÑAS TO CAPE MAYOR.

Llumeres bay; coast; Luanco bay; port; bar; directions; tides; coast; Candás port and bay; coast; cape Torres.....	60-64
Bay of Gijon; dangers; town; basin; resources; lights; bar; outside anchorages; pilots; tides; directions; coast; Tazones bay; light; Mesnada shoal.	64-70

	Page.
Villaviciosa inlet; town; tides; marks; Rodiles point; coast; Lastres bay and town; Colunga River; mount Carrandi; coast	70-73
Rivadesella inlet; town; light; tides; pilots; directions; Serropio bank; Palo Verde islet; Nueva river; cape Mar; coast; San Antolin beach.....	73-77
Cape Prieto; Vaca rock; Niembro inlet and town; tides; Borizo island; Póo bay; Jarri point; Llanes; tides; resources; light; aspect; Santa Clara and Ballota points; coast.....	77-82
The Tinias; Tina Mayor; tides; light; marks; currents; coast; Tina Menor; coast; harbor and town of San Vicente de la Barquera; Meron beach; directions; light; pilots; tides; marks; Peña del Zapato; cape Oyhambre; La Molar; Rábia bay and beach; coast; port Comillas; lights; marks; coast; Luaña and Torriente banks; San Vicente de Luaña; coast; Dichoso point; Canto bank.....	82-94
Inlet of San Martin de la Arena; bar; Saja and Besaya rivers; Cantos anchorage; light; tides; pilots; signals; directions; Cuerno point; Suances islands; coast; bay of San Juan del Canal; inlet of San Pedro del Mar; Cabezo de San Pedro del Mar; cape Mayor.....	94-100

CHAPTER IV.

FROM CAPE MAYOR TO SANTURRARAN POINT.

Cape Mayor; cape Menor; Santander inlet; Santander; Peña Castillo; Maliano point; south coast; Quebrantas bank; Cavada peak; mount Cabarga; lights; signal-station; tides; pilots; quarantine; marks; directions; Langre point; coast.....	101-109
Noja bay; Berria sands; Doble bank; Santoña mountain; lights; Santoña inlet; Limpias; Santoña; port; mount Ano; Puntal del Pasage point; Pitorro bank; bar; tides; pilots; directions; Fraile anchorage; marks; Laredo; mount Candina; Oriñon point; inlet; mount Ceredo; coast	109-119
Castro Urdiales bay; port; town; light; tides; directions; Castro Verde bank; point Mioño; Bilbao bay; Sabiote river	119-122
Province of Biscay; winds; sea; squalls; barometer; currents; directions; Muzquiz point; Somorrostro bay; mount Lucero; Bilbao bay; bar; Nervion river; Portugalete; river; Olaviaga; Bilbao; tides; lights; pilots; directions; coast; Plencia inlet; Gorliz sands; cape Villano; coast.....	122-133
Cape Machichaco; light; Machichaco bay; coast; Bermeo; tides; Laisuas rocks; coast; Mundaca river; town; tides; Isaro islet; Las Lobas; coast; cape Ogoño; coast	133-144
Oguella bay; mount Otoyó; Lequeitio bay; light; tides; San Nicolás island; directions; Sausaten bay; Ondárroa bay; bar; tides; directions.....	144-147

CHAPTER V.

FROM SANTURRARAN POINT TO THE BIDASOA RIVER.

Province of Guipúzcoa; currents; winds; Santurrarán point; Cardal point; port Motrico; tides; Deva inlet; town; pilots; tides; Santa Catalina point; coast; Zumaya inlet; town; pilots; tides; coast.....	148-153
Gueteria bay; anchorage; port; town; light; tides; directions; Alzacarría point; coast; Zarauz bay; town; Malla-arria point; Orio inlet; river; town; pilots; tides; coast	153-157
Mount Hernio; mount Urgull; Santa Clara island; La Banchar; San Sebastian bay; port; town; lights; pilots; tides and currents; pilots; directions; coast	157-164
Port Pasages; town; East and West banks; light; pilots; tides; directions; mount Jaitzquivel; cape La Higuera; light; Amuck island; Higuera anchorage; Fuenterrabia bay; inlet; bar; Irun; Fuenterrabia; Bidasoa river; tides; marks	164-173

CHAPTER VI.

INTRODUCTORY REMARKS ON FRANCE.

	Page.
Tides; tidal currents; tide-signals; weather-signals; pilots; pilot-signals; distress-signals; signal and telegraph stations; buoys and beacons; night navigation; ports of refuge.....	177-185

CHAPTER VII.

FROM THE BIDASOA RIVER TO THE GIRONDE RIVER.

Sainte-Anne point; plateau of Saint-Jean de Luz; passes; bay of Saint-Jean de Luz; Nivelle river, lights; Sainte-Barbe point, lights; Socoa, light, signals; Artha rock; directions, anchorage, tides, town, trade	186-194
Bidart; Biarritz, anchorages, light; Adour river, bar, lights, life-saving station, tides, currents; general directions; outer anchorage; signals; tugs; river, anchorages; Bayonne, docks, trade, supplies, port-charges	194-203
Coast to Arcachon; land and sea breezes; soundings; Fosse de Cap Breton; anchorage; Cap Breton channel, light, life-boat, streams; Huchette beacon; Contis light; Biscarosse beacon; Bassin d'Arcachon, commerce, entrance, bar, tides, currents, light; landfall, directions, caution.....	203-209
Coast to the Gironde; Anchise river; soundings; La Grigne beacon; Hourtin lights, table of angles between lights; Vendays, Soulac, and Saint-Nicolas beacons	209-211

CHAPTER VIII.

FROM THE GIRONDE RIVER TO LES BARGES D'OLONNE.

Gironde river; Dordogne river; Garonne river; La Coubre point, light; Grave point, lights; Grand Banc light-ship; Cordouan light; river-lights; tides; bore; currents; pilots; tugs; approaching the coast, soundings, rules for determining distance from shore, caution.....	211-219
Entrances to the Gironde; Passe du Nord, directions, depths, beating in; La Mauvaise bank; Demi Banc; Barre-à-l'Anglais; Montrevel bank; Passe des Charentais, directions, beating in; Passe du Sud; Rouffiat bank; La Négade point; Olives and Saint-Nicolas banks: entering at night; caution; beating in; passage inside the Platin de Grave	219-227
Anchorage inside Grand Banc, off Montrevel bank, Royan, Verdon, Chambrette; navigation to Pauillac; wreck; quarantine-ground; towns of Royan, Pauillac, Blaye, Libourne; Bordeaux, city, hospital, docks, industries, population, commerce, exports, imports, supplies, port-regulations, expenses.....	227-235
Coast of Arvert; Pertuis de Maumusson; Seudre river light; directions; caution; shores of the pertuis; anchorage of Bry; Seudre river; inundations; tides; currents; Oléron island, population, dangers; La Perroche; La Cotinière; plateaux of Chassiron and Chardonnière; caution.....	235-239
Chassiron point, light; Perrotine lights; Château lights; lights at the mouth of the Charente river; Aix island light; coast to La Rochelle; La Rochelle lights; Ré island, dangers, population; Chauveau point light; Baleine light; Haut Banc du Nord light; Saint-Martin and La Flotte lights; plateau of Rochebonne, soundings, currents, tides, pilots, light-ship, fog-trumpet, caution.....	239-244
General directions for approaching the pertuis, soundings, rules for finding distance from coast; approaching the Pertuis d'Antioche; foggy weather, directions; caution; currents in the offing: Pertuis d'Antioche, soundings, directions, currents, beating in; Le Clône bank; Rade des Basques; Rade de l' Ile d'Aix; La Longe le Boyard; Rade des Saumonars; Rade des Trousses, mooring-buoys, compass-station:.....	244-252
Charente river, tides, currents, high and low water, bar, directions, caution; Rochefort harbor, city, industries, population, commerce, expenses; navigation to Tonnay-Charente; Tonnay-Charente anchorage, commerce.....	252-258

Martrais bay ; Chauveau point, rocks ; to reach Pallice anchorage ; approaching La Rochelle ; outer anchorage, Pointe des Minimes ; Plateau du Lavardin ; Roche du Sud ; La Rochelle roads, port, tides, directions, city, industries, docks, gridiron, population, commerce, exports, imports, expenses...	258-263
Coast northward of La Rochelle ; Aiguillon light ; Lay river ; Grouin du Cou point, light ; Perray river ; Sables d'Olonne lights ; life-saving station ; Barges d'Olonne, light ; Basse Vermenou ; Pertuis Breton, general directions, soundings, currents in the offing ; entering ; landmarks ; tides and currents inside ; Conche des Baleines ; Fief d'Ars ; Saint-Martin anchorages, tide-gauges, wet-dock ; Préau anchorage ; La Flotte anchorage ; Saint-Laurent point ; Pen Breton ; Pallice anchorage ; Aiguillon bay ; Sables d'Olonne port and roadstead ; shoals ; approaching from seaward ; passes between shoals ; tides ; wet-dock, town, population, industries.....	263-280

CHAPTER IX.

FROM LES BARGES D'OLONNE TO QUIBERON PENINSULA.

Ile d'Yeu ; tides and currents ; Petite Foule light ; Port-Breton lights, life-boat ; Corbeau point light ; approaching the island, soundings ; rocks off NW. point of island ; Basse Sanzey ; Port-Breton ; La Sablaire anchorage and bank ; La Conche anchorage ; Corbeau point ; Anse des Vieilles ; Anse du Vieux Château ; Pont d'Yeu, middle channel, southern channel.....	281-288
Coast to Saint-Gilles ; rocks ; beaching a vessel ; Saint-Gilles, light, anchorage ; directions ; caution ; river ; tides ; coast northward, land-marks, shoals ; Fromantine inlet, tides, landmarks ; directions, caution ; Noirmoutier island, productions, population, west coast ; l'Herbaudière point ; Chaussée des Bœufs ; directions and currents ; Pilier island, light ; rocks and shoals ; eastern coast of Noirmoutier island ; La Chaise light ; town of Noirmoutier.....	288-297
Bourgneuf bay ; Pornic, town, lights ; Saint-Gildas point ; La Couronnée shoal ; Pierre-Moine ; currents in the bay ; tides ; anchorages ; directions for entering ; caution ; Le Fain anchorage ; Bois de la Chaise anchorage ; Loire river ; mouth ; dangers ; Mindin point ; river-lights ; Commerce and Aiguillon lights ; Le Pouliguen light ; La Banche bank, light ; Lambarde bank ; Croisic point, lights ; Tréhic light ; Le Four bank, light ; bar of the Loire, tides, currents	297-312
General directions for approaching the coast ; soundings ; pilots ; directions for the Grand Chenal ; Chenal du Nord ; Leven islet anchorage ; navigation to Saint-Nazaire ; anchorage in Bonne Anse ; Saint-Nazaire roads, wet-dock, dock-signals, town, population, imports, exports, expenses ; Paimbœuf, anchorages ; gridiron ; Nantes, town, population, industries, commerce, exports, imports, pilot-regulations, and charges	312-328
Le Croisic, roads, port, town ; coast to the Vilaine ; dangers ; Penlan point, light ; Vilaine river ; Kervoyal and Penpins points ; port Penerf, roadstead, directions, tides, currents ; Anse de Succinio ; Pointe du Grand Mont ; Quiberon bay ; Navalo light ; Crac'h light ; Quiberon peninsula ; Port-Haliguen light ; life-saving station ; La Teignouse rock, light, fog-bell ; shoals ; Chaussée du Béniguet ; Houat island ; Chaussée de l'Ile aux Chevaux ; Haedik island, light ; plateau de la Recherche ; Plateau de l'Artimon.....	328-337
Belle-Ile ; Pointe des Poulains, light, rocks ; semaphore ; port Goulfar ; Belle-Ile light ; port Kerel ; Saint-Marc anchorage ; Pouldon anchorage ; Pointe de l'Echelle ; Arzic ; Kerdonis point ; anchorage, reservoir ; Le Palais, roads, harbor, light ; Taillefer point ; Sanzon, light ; Taillefer and Birvideaux banks, tidal currents	337-343
Landfall ; soundings ; making Le Palais roads ; to clear Taillefer banks ; Belle-Ile channel ; passage west of Le Four ; making the mouth of the Vilaine ; currents in Le Four passage ; tides and currents in the Vilaine ; direct channel ; southern channel ; anchorages ; Rennes ; Redon ; entering Quiberon bay ; La Teignouse passages ; Béniguet passage ; Houat island anchorage ; passes north of Ile aux Chevaux ; Drevantec pass ; pass of Les Sœurs ; Haedik roads ; port de la Chèvre ; working-room in Quiberon bay ; Le Morbihan ; Vannes ; Auray ; tides ; currents ; landmarks ; directions ; anchorage ; caution ; Navalo anchorage ; Saint-Philibert and Crac'h rivers ; Port-Haliguen	343-359

CHAPTER X.

FROM QUIBERON PENINSULA TO PENMARC'H POINT.

	Page.
West coast of Quiberon peninsula; port Maria; life-boat; Portz-Guen; Penthièvre fort; Teviec island; anchorage; Ardevenne point; Pierres Noires; Etel river, life-boat, light, anchorage; currents off the coast; Ile de Groix; Pointe des Chats, shoals; La Croix point, light, life-boat; Grognon and Pen-Men points; Ile de Groix light; anchorage; currents near Ile de Groix...	360-365
Port Louis bay, town, lights; Lorient light; Peyrière light; signal-tower; Ile Saint-Michel; shoals; Talut point; rocks; tides and currents in Lorient bay; approaching Ile de Groix: soundings; caution; landfall; entering Port Louis bay; Port Louis roads; to reach Lorient anchorage; anchorage, wet-dock, port militaire; town of Lorient, lazaretto, population, industries, commerce; Hennebont, trade; life-saving station	365-377
Coast to the northwestward; currents; shoals; Pouldu bay; Quimperlé river; shoals; Donélan port, lights, anchorage; Bélon and Aven rivers, light; Pointe de Trévignon, rocks; Basse Jaune; Pointe de la Jument, rocks; Cabellou point; Kersos bay; Lanriec light; La Croix light; Beuzee light; tides; La Forest bay, streams, currents	377-383
Les Glénans, anchorages; Penfret island light; La Jument; tides and currents; channel north of Les Glénans; Ile aux Montons; channel south of Ile aux Moutons; caution; channel north of Ile aux Moutons; passage south of Men Diou; entering Concarneau harbor; anchorage; caution; dangers; Concarneau roads, town, trade, population; entering La Forest bay; anchorage; Moustierlin point; Benodet bay, tides and currents; landmarks; Odet lights; Loctudy light; eastern passage to Benodet bay, anchorage; middle channel; passage east of Malvie; Cosquer passage; entering at night; shoals; tides at the mouth of Quimper river; anchorage; Quimper river, bar; rocks; towns of Benodet and Quimper; anchorages; Pont l'Abbé river; Loctudy...	383-400
Coast to the southwestward; rocks; Eseasonil port; Guilvinec port, lights; shoals; channels; western passage; lee shore; life-boat; Penmarc'h rocks.	400-403

CHAPTER XI.

FROM PENMARC'H POINT TO BREST.

Penmarc'h point, shoals, light; approaching; soundings; landfall; Taliferne point; beaching a ship at Poulbrien, Wibbine, and Portz-Carn; La Torche point; Audierne; life-saving station; anchorage; Pointe de l'Ervilly; Audierne, port, light; Raoulie point, light; life-boat; bar; tides; shoals; roadstead; eastern channel; channel west of La Gamelle; Grand Chenal; Chenal de la Vierge; signal-station, population, commerce	404-412
Coast to the Bec du Raz; shoals; Bec du Raz, life-boat, rocks, lights; Pointe du Van; Baie des Trépassés; Chaussée de Sein; Ile de Sein, light, life-boat; Basse Occidentale; Basse Froide; passage; Pont de Sein; Hélorète passage; Tronsyard passage; caution; Pont des Chats; tides; Tevennee islet, light, shoals	412-418
To distinguish Ile de Sein from Ouessant; soundings; approaching the Chaussée de Sein from the southward; to avoid the Chaussée, rule and table; coming from the northward, rule and table; coming from the westward, rule and tables; caution; Raz de Sein; currents; directions; anchorages, pilots...	418-427
Donarnenez bay; south shore, shoals; eastern shore; northern shore; Basse Vieille; dangers; anchorages; Donarnenez; Tristan island, light, life-boat; Rosmeur point jetty light; dangers; tides; directions; the Iroise; Dinant and Penhir bays; Tas de Pois; Tonlinguet point, light, life-boat; dangers in the Iroise, currents, winds; passes among the rocks; Corbeau, Petit Léac'h, Tonlinguet, Le Pélén passes; Camaret bay, town, port, life-saving station; directions; tides; Capneins point, light	427-439
Goulet de Brest; Petit Minou and Portzie lights; dangers; currents; Grand Minou point; Bertheaume bay; Créac'hmeur point; Saint-Matthieu point,	

	Page.
light, signals; shoals; Brest roads; basin lights, fog-bell; Saint-Marc and Corbeau banks; Plougastel; western shore of roads; Anse du Fret; distance-buoys; dangers in the roadstead; Saint-Pierre bank; tides, currents, guard-boat, mooring-buoys, compass-station, quarantine-ground, pilots....	439-451
Approaching Brest; navigating in the Iroise; soundings; the Goulet; the roads; at night; caution; beating in; working-room in the roads; leaving the roads; caution; Penfeld river, bar, signals; Brest, town, population, commerce, imports, exports, coasting-trade, expenses, industries, repairs and assistance, supplies, boat-landing; Landerneau river, town, expenses; bar, dangers, anchorages, tides, pilots, directions; Rade de Châteaulin, working-room; Pen-a-land anchorages; Tinduff bay; Landévennee channel; Le Faou; Châteaulin river, towns.....	451-462

CHAPTER XII.

FROM SAINT-MATTHIEU POINT TO MELGORNE POINT.

Coast; Basse du Chenal; Kermorvan point; rocks; Le Conquet port, light, life-saving station; Anse des Blanes Sablons; Corsen point; Laberildut; rocks; Mélon island, town; shoals; Portzpoder bay; Melgorne point; Le Four rock, light, fog-trumpet; Ile d'Iock, shoals; tidal currents, Les Plâtresses....	463-467
Basse Orientale du Courleau; Les Bossemen; Basse Royale; Chaussée des Pierres Noires; Pierres Noires light; Les Cheminées, Le Ranvel; Basse Large; Kérouroe; Placen-ar-Béniguet; La Siège rocks, passage; Petit Tauréau; Béniguet island, currents; Les Belveignou; new channel into Le Four; directions; Lytiry, Quéménès, and Lédénès de Quéménès islands; Morgol; Le Cromic; passage between Quéménès and Triélen islands, directions; Vieille Noire; Plateau de la Helle; Triélen island; Les Serroux; Molène island, life-boat; Balanee and Bannec islands; Pierres Vertes; pilots.....	467-475
Ouessant island; Creac'h light, life-boat, fog-trumpet; Leurvas and Corn-Pern rocks; Lampaul bay; guard-boat; La Jument; Pen-ar-Roe'h anchorage; Portz-Guen; Port de Darland; Le Stiff, light, bay; Beninou bay; Le Crom; Chaussée de Keller; Raz du Florus; Haut-Fond d'Ouessant; Fromveur passage	475-480
Tides, currents near Ouessant and in the Fromveur; landfall; thick weather; Haut-Fond de la Chapelle, rules for finding; to make Ouessant from the westward, rule, caution; coming from the northward; appearance of the island; course to Brest; pilots; Chenal du Four, currents, directions, caution, beating through, anchorages; Chenal de la Helle.....	480-488

APPENDIX.

SPAIN.

Quarantine; tonnage dues; rule for ascertaining Spanish tonnage; money; weights; measures; table for the reduction of English avoirdupois to kilograms	488-498
--------------------------------------------------------------------------------------------------------------------------------------------------------------	---------

FRANCE.

Tonnage-dues; customs-dues and regulations; harbor regulations; measures against fire, &c.; quays; locks, bridges; port-officers; pilot-regulations; dock-charges; gauging French ships; extraets from convention concluded February, 1853; quarantine laws; measures, weights, and coins	498-517
INDEX	519-529

NORTH COAST OF SPAIN.

BY

LIEUT. GEORGE M. TOTTEN,

UNITED STATES NAVY.

1 N C

CHAPTER I.

FROM CAPE ORTEGAL TO RIVADEO INLET.

Variation in 1876: Cape Ortegal, $21^{\circ} 10'$ westerly; Vivero, $21^{\circ} 05'$ westerly.

The portion of coast described in this work is that comprised between cape Ortegal on the W. and the Bidasoa river on the E., or all that portion of the coast of Spain washed by the waters of the bay of Biscay. The Spanish coast is abrupt, rocky, and precipitous, and eastward of cape Ortegal no good harbors are found, unless those of Barquero and Vivero.

The bay of Biscay is about 300 miles across from cape Ortegal to Ushant, bearing about NNE. and SSW. from one another, and is 240 miles deep to the SE. The central part of the bay is very deep. The 100-fathom line of soundings passes about 65 miles SSW. of Ushant, and skirts the W. coast of France at nearly the same distance, approaching to within 35 miles, however, at the SE. angle of the bay. Beyond the 100-fathom line the depth augments rapidly, and about midway between cape Ortegal and Ushant there are found more than 2,600 fathoms. At 40 miles from the land, all along the N. coast of Spain, there is no bottom found at less than 2,000 fathoms, and at 15 miles the depths range from 150 to 200 fathoms, rock and coral, but frequently no bottom is found at this depth even nearer the coast.

Bay of Biscay.

Northerly winds prevail and are strongest on the parallel of the Pertuis; thence they decrease in frequency and force in approaching the Pyrenees, and the same effect obtains in nearing the British channel.

Winds.

The greatest number of days of northeasterly winds is about on the parallel of the island of Groix, and on the island itself these winds are much more frequent than those from the SE. The days of NE. wind decrease as the Pyrenees are approached. The E. winds blow equally throughout.

The number of days of SE. wind is greatest at Brest and least at the island of Aix; and the number of days of S. wind increases as the Spanish coast is approached; at Biarritz it is three times as great as at Brest.

The number of days of SW. wind is about the same throughout, (60 days a year,) with a slight increase at Brest, and this wind always brings bad weather. NW. winds are most frequent at Brest and least so at Biarritz.

The localities most affected by the different winds depend somewhat on the contour of the coast; thus the heaviest SW. gales are experienced between Brest and the mouth of the Loire; the heaviest westerly gales abreast Pertuis and the Gironde district; and the heaviest WNW. gales in the lower portion of the bay.

The storms of the bay of Biscay almost always originate about the border of the Gulf stream, or in the vicinity of the Azores, and develop characteristics similar to those of the cyclones of the Antilles, having a progressive motion toward the E. or SE., and they are preceded by a falling barometer and rising thermometer. They are usually felt at the southern point of Ireland or on the coast of Portugal before they enter the bay. The meteorological reports posted in the offices of the various ports give the probabilities of the weather for the following 48 hours for Valencia, Coruña, and Brest, and though these are sometimes incorrect for light winds, they may be thoroughly relied upon in regard to storms. The meteorological records show that, in a majority of cases, the center of a storm passes outside and N. of the bay of Biscay.

The *vendavales* commence with wind from the S., hauling to SW. and then W., and constantly increasing in force, with frequent and violent squalls. It then hauls to NW. and to the eastward of N., and fair weather recommences. If the wind backs to the westward another gale succeeds.

In the vicinity of Brest, SE. gales are often violent and lasting, and are accompanied by dense fogs, hiding the land, and strong NW. currents, so that a vessel lying-to is often drifted 50 miles to leeward in 24 hours.

Along the Spanish coast, in winter, northerly winds often bring fog.

Continued.

The prevalence of NW., W., and SW. winds causes a

heavy swell and considerable current, to which due consideration should be given. The waters of the gulf have a vast gyratory movement, irregular in outline, and variable in velocity on account of the considerable effect of different winds. The SE. current, setting on to the NW. point of the Iberian peninsula, is divided there into two branches, one setting S. along the Portuguese coast and then turning to the eastward about cape Saint Vincent; the other setting E. along the N. coast of Spain, and N. along the W. coast of France, where it is 15 or 20 miles across, and is felt at 30 or 40 miles off shore; it becomes wider as it proceeds northward, and is probably joined at times by the streams from the rivers of France. On the parallel of about $48^{\circ} 20'$ N. it is about 80 miles across, and the set, following the coast-line, is nearly WNW., passing 15 or 20 miles from Ushant and across the entrance to the English channel. The commotion of the waters at the time of the flood-tide in the channel, all along the line of separation, has undoubtedly given rise to most, if not to all, the reports, formerly quite frequent, of rocks and broken water in this vicinity. It is hardly necessary to add that all search for such dangers has been unavailing.

On the parallel of Ushant the whole extent of the edge of soundings may be discovered in fine weather from the numerous rippings in its vicinity, and in boisterous weather the transition from deep water to comparatively shoal is rendered apparent by the sudden alterations in the color of the water, which changes from blue to various shades of green. As Ushant is approached, the depths slightly decrease, though they will be found to vary a few fathoms, more or less; at the distance of 48 miles from the island, and on its parallel, there are 72, 71, and 70 fathoms, with coarse, pale-yellow ground, resembling semi-indurated marl, with a mealy surface, interspersed with pieces of broken shells, and a substance like chaff. At 27 miles from the island there are from 66 to 63 fathoms, with the same bottom, and 65 fathoms are found within 9 miles of the rocks. When approaching Ushant in thick weather a vessel should not come within 70 fathoms water, and should keep the lead going.

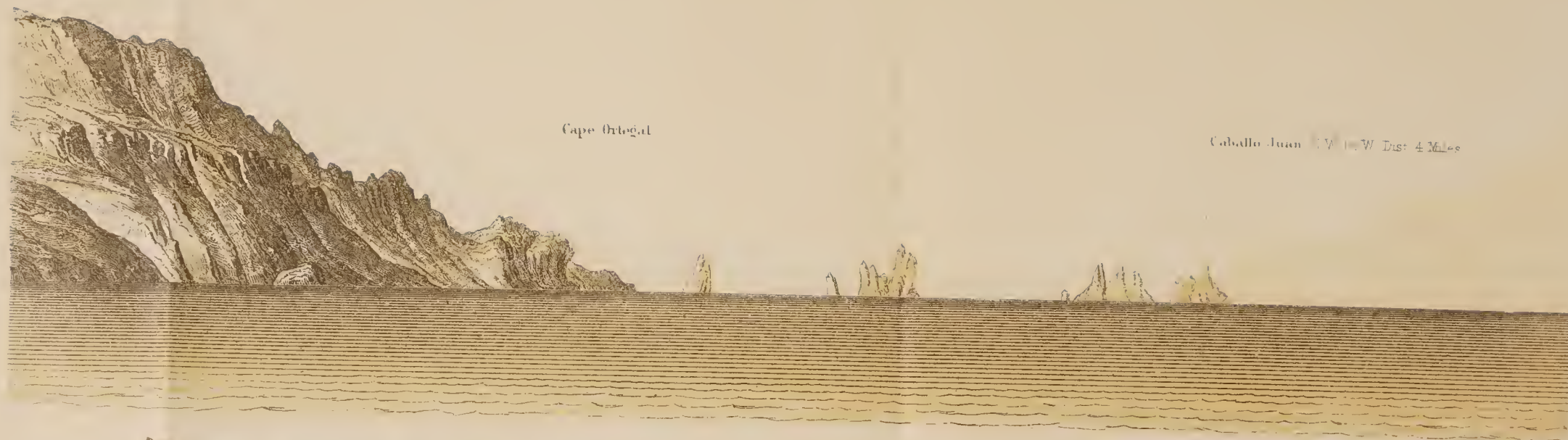
On the parallel of the Chaussée de Sein, commonly called the Saints, the transition from deep to comparatively shoal water is very sudden; in lat. $48^{\circ} 02' N.$, and long. $8^{\circ} 04' W.$, there are 396 fathoms water over dark grayish-blue mud; at only 8 miles westward of this position there are 529 fathoms, and the whole of the southwestern edge of the bank appears equally steep. Between the parallels of Penmarc'h point and Rochefort, or between $45^{\circ} 50'$ and $47^{\circ} 53' N.$ latitude, where is a remarkable tract of soft mud, limited on the SE. by the plateau of Roche Bonne; it is about 150 miles in length and 20 miles in breadth, and is useful to verify a vessel's position. The surface of this mud is very soft, especially on its edges, where it is mixed with a little very fine gray sand, and it will scarcely stick to the lead; to the eastward the mud is more firm, and to the westward rocky bottom is more or less apparent. This difference between the qualities of the bottom leaves the bed of soft mud in a NW. and SE. direction.

Off the mouth of the Loire between Belle Ile and Ile d'Yeu, the difference between the two qualities of the bottom is less apparent. Between these islands the bottom is of sand and gravel, and of broken and pulverized shells. From the western edge of the soft muddy bottom, it is in general muddy sand, mixed with gravel and some broken shells; the muddy sand extends only a few miles westward to a sandy bottom, inclining nearly in the same direction. In the offing, westward of the soft mud above described, the bottom is of sand of a grayish color, and frequently mixed with broken and pulverized shells. This quality of the bottom continues westward to soundings of 180 fathoms, and extends NW. and SE., between the parallels of about $45^{\circ} 50'$ and $47^{\circ} 25'$.

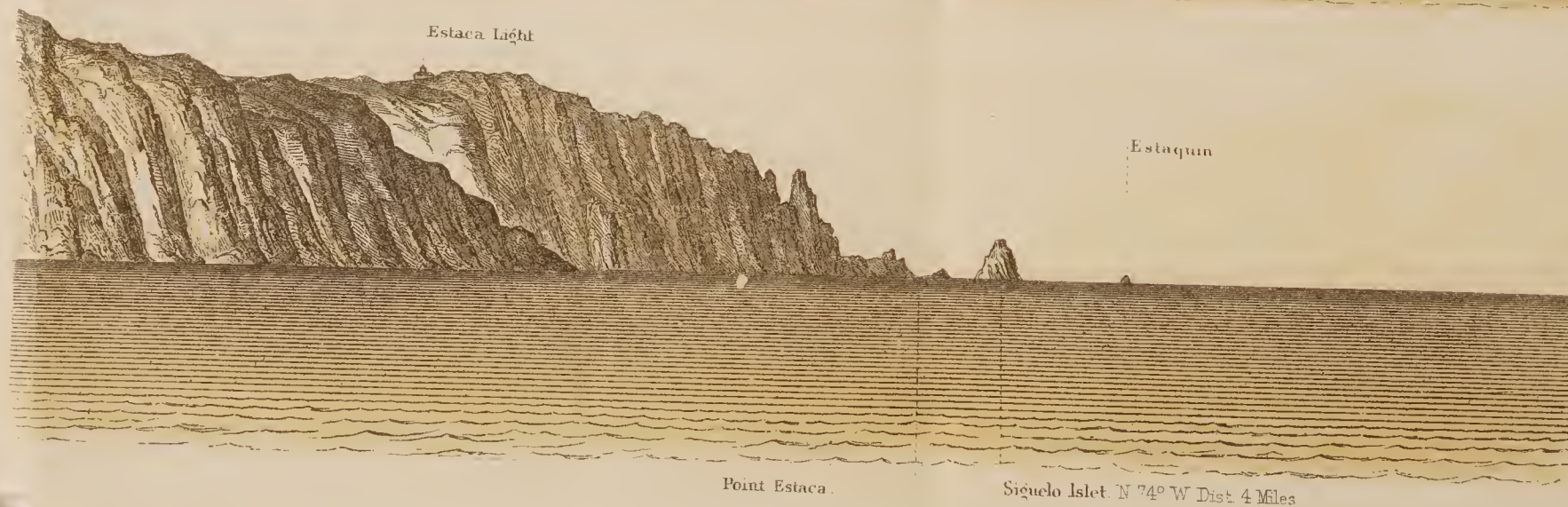
Route.

Vessels bound southward from the English channel, and having a fair wind, should at once make westing, as the prevailing winds are from that quarter. It is usual, therefore, on leaving the Lizard to shape a SW. course, to be able to weather Ushant should the wind become adverse; and it is absolutely necessary to check the dead reckoning by frequent astronomical observations to find the influence of tides and currents, and to reach the parallel of the N. coast of Spain sufficiently to the westward for the safety of the ship. In threatening or bad weather, if it is necessary to

Nº 1



Nº 2



Conejera S. 60° W

Cape Vares

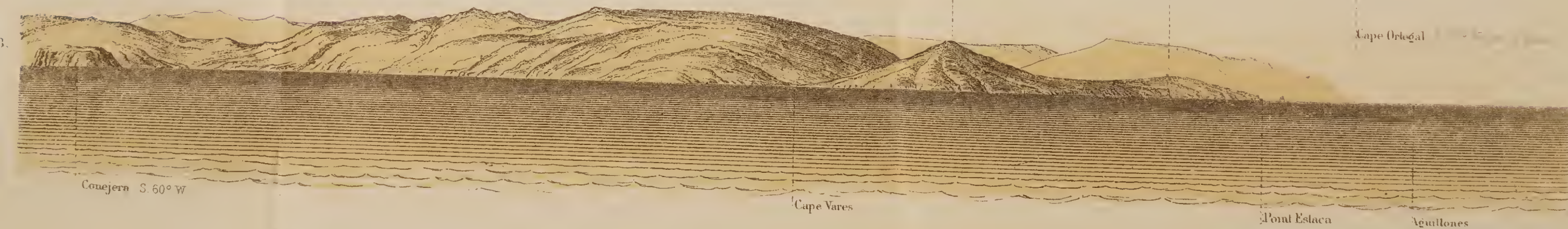
Point Estaca

Aguillones

Mt Vares. S. 72° W.

Light. S. 77° W.

Cape Ortegál



Nº 1.



Nº 2



Nº 3.



Conejera S. 60° W.

keep on instead of seeking a good anchorage, the vessel should be brought to the wind on the tack which will enable her to approach the proper course without drawing deep into the bay. When embayed by westerly gales and the attendant in-draught of the current, it may be very difficult to weather cape Finisterre or even cape Ortegal, under which circumstances shelter may be sought in Ferrol, Coruña, Barquero, or Vivero, and, in extreme cases, in the ports of the W. coast of France. The tremendous seas that roll in along the N. coast of Spain, with northerly and westerly gales, are also an element of danger, and the entire navigation off the NW. promontory of the Iberian peninsula demands unusual precaution and skill.

Cape Ortegal, in the province of Coruña, and the southwestern limit of the bay of Biscay, is locally known as the Alto de Limo, while the name of Ortegal is given to cape Aguillones. It is high, round, and precipitous to seaward, and when seen from the NW. may be recognized by the terraced table-lands rising gradually to the summit, on the central point of which is the little tower of Limo, 930 feet above the level of the sea.

Cape Ortegal.

From the foot of the cape a tongue of low land projects, called Limo point, surrounded by sunken rocks to the distance of 50 yards, on which latter the sea always breaks. A dangerous shoal, called Lée bank, lies about half a mile N. of Limo point. On this shoal there are $2\frac{1}{2}$ fathoms at low water, and in the channel between it and the shore there are 13 to 16 fathoms.

On making the land from the northward the point is not easily distinguished, being backed by higher land. It may be known, however, when on this bearing, by a steep, black, triangular bluff close to it.

Seen from the NE. the cape appears rounded, and the terraced table-lands are then apparent.

Two miles off shore there are 40 fathoms water, with a bottom of sand and shells, the depth gradually diminishing toward the shore. Strong NE. winds are here frequently preceded by a strong easterly current.

During pleasant weather the land here and to the westward may be coasted at the distance of 1 mile, but when bad weather is expected, or during the winter season, it

would be prudent to give it a berth of 5 or 6 miles at least.

Cape Aguil-
lones.

The coast between cape Ortegal and cape Aguilones, which lies $1\frac{1}{2}$ miles E. $\frac{3}{4}$ N., is high, steep, and inaccessible. The sea is heavier and the currents are stronger here than in any other part of this coast, and sailing-vessels should, therefore, give it a wide berth.

Cape Aguilones is formed of steep, broken rocks, terminating in sharp peaks that rise to a considerable height. On the NW. side it is black, steep, and inaccessible, but not so much so when seen from the SE. The NE. face forms a triangular bluff half a mile long.

From this cape a chain of rocky islets extend NE. by Islets and rocks. N., also steep and broken, and rising almost vertically from the sea. The most distant from shore, which lies 1 mile from the cape, is called Caballo Juan; the next one inshore is surmounted by three sharp peaks and is called Tres Hermanos; the next and largest of the chain is named Insua Mayor; the fourth, shaped like a pyramid, is El Rodicio, and the nearest one to the cape is named La Longa. Outside of these islets at a short distance is a sunken rock, called La Rocemada, on which the sea always breaks. There are passages between these islets, and inside them, for small vessels, in which the least water is 10 fathoms, rocky bottom. NE. of these rocks, and 1 mile distant from them, are found depths of 30 and 35 fathoms, coarse shells.

Coast.

The triangular bluff of the NE. face of cape Aguilones is called the Fronton de Gargacido, and the point at its eastern extremity Seijo or San Julian point, the latter being the name of a hermitage in its vicinity. Off this point at a short distance is a steep, rugged islet, called Marbeira, having between it and the shore a channel 50 yards wide, with a depth of 5 fathoms.

Cariño inlet.

Between Seijo point and the Piedras Meas rocks, 2 miles ESE., is the entrance to Cariño inlet, a narrow estuary about 5 miles deep, with two arms, extending east and west. On the larger of these, the eastern one, the town of Santa Marta de Ortigueira is situated.

Cariño inlet is navigable in mid-channel at Fraile and Carnero points, having 18 to 20 fathoms at the entrance, but only 4 fathoms near the bar of Santa Marta between these

two points. It is not at all a safe place during the winter months.

A little more than 1 mile S. of Seijo point is Cariño point, low and rocky, with shallow water for some distance off it. The coast between is steep and clear of danger, with Gabeira islets lying so close to it as not to afford passage for boats.

Near Cariño point are the ruins of barracks belonging to former fortifications. This point is the northern limit of Cariño bay, about 8 cables wide and $1\frac{1}{2}$ deep. In the middle of the bay there is a depth of 3 to 4 fathoms, sandy bottom, the water gradually shoaling toward the beach, on which is situated the town of Cariño, having a population of about 1,600 inhabitants. This bay is ill protected and little frequented. The southern limit of the bay is point Castro de Moura, and just to the southward of it is Monteran or Mentaron point, off which are two flat rocks, generally above water. Inside of them there is a boat-channel, and between them a passage with 4 to 5 fathoms. The outside one is steep-to, and may be passed close-to in 7 fathoms, sandy bottom.

From Monteran the coast, of moderate height but backed by high land, continues to Fraile point, which may be known by a small conical islet just off it. About 1 mile farther to the eastward is the islet of San Vicente, commonly called La Insua, large, rounded, and covered with trees and bushes. Between this islet and Carnero point is a passage for boats at high water.

The bar of port Santa Marta has two channels—one near the island of San Vicente, and the other near Fraile point. Port Santa Marta. The former has the deeper water, but the latter is better, because straighter and more easily navigated. Within the bar is a large sand-bank, dry in places at low water, only a few boat-channels being left open. Off Sismondi and in the western part there are deep places, with 5 to 9 fathoms, affording anchorage.

As these channels are changed by gales of wind, a pilot should always be taken. Vessels bound to Santa Marta generally anchor off Cariño point to wait for a pilot, or for a chance to cross the bar. The village of Sismondi has about 200 inhabitants, and stands on a hill about half a mile

inland. Farther in is the harbor of Santa Marta, 3 miles long and 2 miles wide, but much obstructed by sandbanks. It is the best and most sheltered anchorage on this part of the coast for small craft. Vessels can carry 9 feet at neap-tides and 11 feet at springs up to the town, which lies on the north side of the harbor and has about 1,000 inhabitants. Good water and provisions may be obtained. Nothing is exported from here, and salt is almost the only import.

Tides.

It is high water, full and change, at 3^h at Santa Marta, and at 2^h 30^m at Sismondi. Spring-tides rise 11 feet and neaps 9 feet, but the height of the water is much affected by the wind.

Espasante bay
and village.

To the NE. of Carnero point is Espasante bay, with a small village of the same name on its shore. The bay, although spacious, affords no shelter, and is not at all frequented.

Espasante bay is separated from another bay farther north, called Concha de San Antonio, by a high, rocky point, surmounted by a watch-tower.

Bandeja point.

From the rocky extremity of Bandeja point, the northern limit of the Concha de San Antonio, a reef, covered with 3½ to 13 fathoms water, extends 2 miles off shore, to the Piedras Meas, two rocks lying awash at this distance NNW. from the point. In heavy weather the sea breaks all the way across the channel inside of them; it should, therefore, only be used in fine weather. In passing inside of these rocks, they should be kept close aboard; in passing outside, they should be given a berth of at least one-fourth of a mile. From Bandeja point to point Estaca the coast trends NE. by E. for 5 miles, and is formed of steep, whitish bluffs, with small beaches between them. Near Bandeja point the land is mountainous, gradually sloping toward point Estaca.

Piedras Meas
rocks.

Caution.

Cariño inlet can only be used safely in the summer months, and favorable conditions of wind and tide should be awaited before attempting the bar of Santa Marta. Any swell from NE. to NW., through N. outside, is much felt in the inlet, and there is but little shelter, except within the bar and for the smallest vessels.

The coast from cape Prior to point Estaca is rocky, bluff,

Mt Vares.

Point Estaca.

N 1

Conejera Id S 78° W Dist. 5 miles

Light

Anzaron Id Dist 2½ miles.

Roaredora Point.

Conejera Id

Point Estaca. S 71° W.

Light

Cape Moras. N 27° W Dist. 2½ miles

Anzaron Id

Point Roncadora

Conejera Id

Point Estaca.

and inaccessible, and with N. and NW. winds it is dangerous to approach in winter.

The NW. winds are most frequent on this part of the coast in winter, and cause the heaviest sea. They last sometimes for fifteen days, or even longer, and are frequently accompanied by violent squalls of wind and rain. Winds from SSW. and SW.—the *rendavales*—bring thick weather, and are often followed by a severe northwester. NE. winds are not as frequent as in summer, but blow hard, with rain, when they do occur. South winds almost always blow freshly, with clear weather, and last frequently for a week; as soon, however, as cloudy weather supervenes, the *rendaval* may be expected, to be again followed by wind from NW. Winds in winter.

A heavy NW. swell is often the forerunner of a strong gale from that quarter.

In summer, or rather from June to October, NE. winds prevail, with generally good weather and smooth sea. NW. winds, when they occur, are gentle and do not last long. The *rendaval* is rare, especially in June. Wind in summer.

In fine weather the only currents off this shore are those produced by the tides, the flood running NE. or E., and the ebb SW. or W. Currents.

Well off shore, at a distance which has never been exactly determined, a constant NE. current is felt, sometimes strong enough to check the ebb-tide. With a fresh NE. wind the strength of this current increases, and its effect is felt closer inshore. Westerly currents are rarely felt.

Point Estaca, the northern extremity of the Spanish peninsula, is the western extreme of the rocky promontory which terminates $1\frac{1}{2}$ miles farther to the eastward, in cape Vares, the foot of a conical hill called monte del Cabo, 694 feet high. Point Estaca extends toward the NW., and, narrowing as it advances into the sea, terminates in pointed, weather-worn rocks. Estaca point.

Two conical, rocky islets lie a short distance off point Estaca. They are called Los Siguelos, the outer and smaller of the two being still further distinguished by the name of Estaquin. Immediately outside of Estaquin are two rocks just awash, and from here the water deepens gradually to seaward, there being 14 fathoms 1 cable outside of Estaquin, Los Siguelos.

and 22 fathoms, rocky bottom, at 2 cables farther out. With a NW. wind this vicinity should be avoided, as then the sea breaks heavily at a distance outside of Estaca point.

Light: Lat. $43^{\circ} 47' 20''$ N.; long. $7^{\circ} 44'$ W.

From a light-tower on a hill about half a mile SE. $\frac{1}{2}$ S. of Estaquin, a *white revolving* light is exhibited, attaining its greatest brilliancy once *every minute*, and visible 23 miles in clear weather. The light-keeper's dwelling adjoins the tower, which is 35 feet high. The focal plane of the light is 306 feet above the level of the sea.

Cape Vares.

Cape Vares, about 2 miles SE. from the Sigüelos, is high, round, bold, and steep to seaward. The intermediate coast, facing NNE., is steep and almost inaccessible, and should be given a wide berth when the sea is heavy, or when sailing along the coast at night. Near the middle of this front is the steep point of Moñños, off which some detached rocks extend to the northeastward. A near approach to cape Vares is practicable, but it should be borne in mind that, with winds from SSW. to WSW., there are frequent and dangerous squalls in its vicinity, and the same is the case with W. winds, though the squalls then are not so heavy.

In making Barquero inlet, with winds from SW. to NW., a vessel is sheltered from the sea, when abreast cape Vares, by point Estaca and the islets off it.

Barquero inlet.

Between cape Vares and Conejera (Coelleira) island, $1\frac{1}{2}$ miles SE., is the entrance to Barquero or, as it is sometimes called, Vares inlet. It is wide, clear of danger, easy of access, with sandy bottom, good holding-ground, and it is sheltered from all winds except from the eastward, but these do not raise sufficient sea to endanger vessels that have good ground-tackling. The inlet extends 3 miles to the SW., narrowing gradually; abreast Vicedo it is half a mile wide. The soundings decrease gradually from 18 fathoms at the entrance to $3\frac{1}{2}$ fathoms between Santa and Castro points. Beyond this the depths lessen more rapidly, so that a large portion of the head of the inlet is dry at low springs, a few channels, however, being kept open. The bottom is chiefly of fine sand, with some patches of gravel about the entrance. The shores are generally high, clean, and steep-to, so that vessels working in may approach them boldly, except between the points of Santa and Campelo, where

there is a 2-fathom bank. The little port of Barquero is at the head of the inlet, but vessels of 10 to 12 feet draught can only reach the town at high spring-tides.

At half a mile SW. of cape Vares is the bay of the same name, 6 cables wide and $3\frac{1}{2}$ deep, to NW. In the northern part of the bight there is a fine beach, and back of it the town of Vares, with a population of 630. A ledge, extending more than 100 yards WSW. from Bufato point, shelters a portion of the bay and beach from the sea that rolls in from the NE. Coasters make frequent use of this harbor; in summer they anchor here during NW. winds, letting go in 6 to 8 fathoms near the middle of the bay. Larger vessels anchor farther out, in 10 to 12 fathoms. In winter, the season of NE. winds, it is better to avoid it, and in any case, vessels anchored here at this season should be in readiness to get under way at the first sign of a NE. wind, and put to sea or make the anchorage of Vicedo.

Vares bay.

Anchorage

In winter the best shelter from winds from SW. to NW. is in the large bay formed by the sweep of the coast between points Almeiro and Sobrepuesta, in 4 or 5 fathoms for small craft or farther out for large vessels. The best anchorage for men-of-war is off the Campelo beach in 7 fathoms water, rather nearer the W. than the E. shore of the inlet. The best position, and the freest from squalls, is with point Castrogrande in line with two mills seen above the beach, and point Santa in one with mount Furado. The chart of this inlet, B. A. No. 77, shows clearly these different anchorages. Shelter from N. winds may be found on the W. coast of the inlet, close inshore between Almeiro and Campelo points. Campelo beach cannot be seen until Almeiro point is passed in entering.

The steep points of Sobrepuesta and Santa are at the foot of a high hill, from which fierce gusts sweep down. They are close together, and project so as to narrow the inlet. There is good anchorage for vessels of not more than 12 feet draught, in winds from S. to N. through W. just off the points; but with NE. winds it is unprotected, and when these commence it is well to shift the anchorage to the opposite shore.

Sobrepuesta
and Santa points.

The little port of Barquero lies to the westward of Santa point, between it and mount Furado. Its importance is much diminished, as it is obstructed by sands, increasing

Port Barquero.

annually, leaving only a small channel under the northern shore, where there are but 6 to 8 feet water at low tide. The bar at the entrance nearly dries, and vessels bound to Barquero have to wait for high water and favorable circumstances, for with NE. winds, however little sea there may be, the sea breaks all across the bar. In the channel there are occasional soundings of 9 feet, but their extent is small, and but few vessels of even moderate draught are constantly afloat there.

The town, in the form of an amphitheater, stands under a cliff at the foot of a hill 894 feet high, and in a small elbow on the northern shore. The population is about 900, but there are few resources. There is a small mole for unloading.

Sor river.

Between the town of Barquero and the point of mount Furado, commences a long inlet, called the river Sor, extending $1\frac{1}{2}$ miles to the southward and then $2\frac{1}{2}$ miles SW. It is about 200 yards across at the entrance, and wider within, and a little dredging would make it a commodious and safe port. There are some spots in it with 7 or 8 feet at low water, while in other places there is hardly sufficient depth at half-tide for large boats over the banks of fine sand and mud by which it is obstructed. In winter and during the season of the *temporales*, vessels lying at Barquero seek shelter in this inlet, and it is frequented by vessels of small tonnage for cargoes of a white earth used for the manufacture of pottery. Both here and in the port of Barquero several anchors are always used on account of the strength of the tidal current.

Mount Furado.

Mount Furado is a small peak, covered with sand and terminating in a low point to the NE. Thence the coast trends southward and eastward to point Castrelos, forming Longa beach, 7 cables in extent, from which runs an extensive shallow flat.

Puerto de Vale.

Beyond Castrelos point, and between it and Videiros point, is a bay 4 cables wide and 2 deep, well protected but very shallow, so that the fishing-vessels that frequent it haul up on a clean beach at its head. A few scattered houses and storehouses for the dried fish constitute the village of Vale, in rear of the beach.

Between Videiros and Castro points there is the little Videiro beach, and between Castro and Congrera points is a bight 2 cables wide, called the port of Vicedo, off which is considered the best anchorage in the inlet in NE. and E. winds. The bottom is of sand and mud, the holding-ground good, and the depth about 3 fathoms at low water. Small craft arriving off the entrance to Barquero in NE. winds often anchor in this bight, sometimes making fast to the rocks. There is a beach at the head of the bight, and a spring of good water near it. The village of Vicedo, rapidly increasing in size, is scattered about the environs of the port.

Point Cueva Baja, high and rocky, is 2 cables NNE. of ^{Cueva Baja point.} point Congrera, and is the limit of the anchorages in NE. winds. Thence to Conejera island, 2 miles E. $\frac{1}{4}$ N., the coast is high, clean, and steep-to, and may be approached boldly in working in, but it is exposed to the NE. winds.

Conejera (Coelleira) island is a mile in circuit, high and ^{Conejera isl- and.} steep to the N. and NE., but lower to the S. On the W. there is a little cove used as a landing-place. The island is covered with vegetation, and near the landing are the ruins of a temple. A shoal named the Esquizo extends out for about 50 yards from the northern portion of the island, where the sea breaks when there is much swell from the NW.

Between the island and the main there is a channel ^{Coelleira chan- nel.} $2\frac{1}{2}$ cables wide, with $9\frac{1}{2}$ fathoms water in the middle, that is much used by coasters when the sea is smooth. With gales from the N. or NW., however, the sea breaks the whole way across it, and S. winds bring squalls, which, with the whirls of the current, make the passage dangerous for a slow-working vessel. If obliged to use this channel, an anchor should be kept ready for letting go.

On the eastern side of Conejera island there is a circular ^{Light: Lat. $43^{\circ} 45' 36''$ N.; long. $7^{\circ} 40' 16''$ W.} gray-granite tower, 24 feet high, with white lantern, which exhibits, at 273 feet above sea-level, a *fixed white* light, visible 9 miles in clear weather. A keeper's dwelling ad- joins the tower.

The great advantage of the inlet of Barquero is the ease ^{Advantages.} with which it may be reached in on-shore winds, it being the only harbor of refuge for vessels of large draught on the

whole Cantabrian coast in westerly gales. It was here that 20 sail of merchant-vessels rode out the heavy gales of 1839-'40. The most dangerous wind is from SW., and great difficulty is experienced in making an anchorage with a storm from this quarter. In such a case a great effort should be made to pass tolerably close to cape Vares, tacking then to windward of Coelleira island, and anchoring off Vares bay, unless it seems possible to work farther in. Large vessels should endeavor to reach this port when caught in a storm from S. or SW., and unable to make a harbor W. of cape Prior, for, except the port of Vivero, which adjoins it, the only harbors to the eastward are very small and obstructed by dangerous bars.

Water.

There are three or four good watering-places in the inlet. The best place, before mentioned, is on the SE. shore, near Vicedo village. There is also an excellent run on the opposite shore, near Campelo point, where two or three boats can water at the same time, even at low tide. In Vares bay it may also be had, though not so good as at the other places. Barquero has good water, and here, as at Vares, some supplies may be purchased; but provisions in any quantity must be procured from Vivero, 6 miles inland.

Tides.

It is high water, full and change, at the mole of Barquero, at 3^h 15^m; ordinary springs rise 9 feet and neaps 6 feet. The rise is 3 to 4 feet above the ordinary level, with strong NW. winds, and the contrary with those from the NE. The current in the channel runs 3 miles an hour at springs.

Directions.

In approaching from the westward, with westerly winds, and especially with SW. winds, a vessel should keep sufficiently near the coast to recognize it, as the land is frequently much obscured. If cape Prior have not been sighted, cape Ortegal is a good mark, and will be known by the Aguillones islets lying well out; and as these are not so high as the cape, they are more easily made out in thick weather. The next mark is point Estaca, running down rugged to the sea, with a light-house on the summit and some conical islets lying off it. With smooth water Estaquin, the outer islet, may be passed at about 1 mile or less, so as to pass close to Cape Vares, which is bold and may be kept close aboard, but with strong winds from W. to SW. heavy gusts rush down it, endangering a vessel's masts, so

that great precaution is necessary. With SW. and SSW. winds there is not much sea along the coast, but with a swell from the NW. a wide berth should be given Estaquin islet and the rocks off point Moñños, passing the former at a distance of 2 or 3 miles, as a NW. wind will permit an easy approach to cape Vares.

With strong S. winds it is indispensable to approach the coast as near as the dangers off it will allow, heading first for Coelleira island, as that is the most favorable point for making the first board into the bay. If the wind be too strong to allow of reaching port Barquero, an endeavor should be made to reach the anchorage of Vivero, which is equally good with these winds.

With all other winds there is little difficulty in entering. A large vessel bound for the inlets or ports of the coast of Asturia, or for Santander, overtaken in this vicinity by a SW. gale, should enter and wait at Barquero for better weather on account of the difficult bars of the eastern harbors.

The inlet may be recognized by point Estaca, the lowest land along this part of the coast, by the mountain of cape Vares, and by a hill 894 feet high, on which stands the Vares watch-tower. As soon as the inlet opens, Longa beach and mount Furado are seen.

In fair weather and in the summer the land and sea breezes blow along this portion of the coast, the sea-breeze blowing from NW. during the day. In the evening the land-breeze commences and blows until 8 or 9 a. m., when it falls calm and the sea-breeze recommences.

The prevailing wind is from NE., and brings fair weather. In summer it is very frequent, but in winter it lasts but a short while and blows strong.

Vessels needing help in mooring, getting up anchor, &c., may obtain assistance from the fishing-boats and others of Vares and Vicedo; and pilots may be obtained at Barquero or Vares to take a vessel over the bar. Pilot charges are 30 reales.

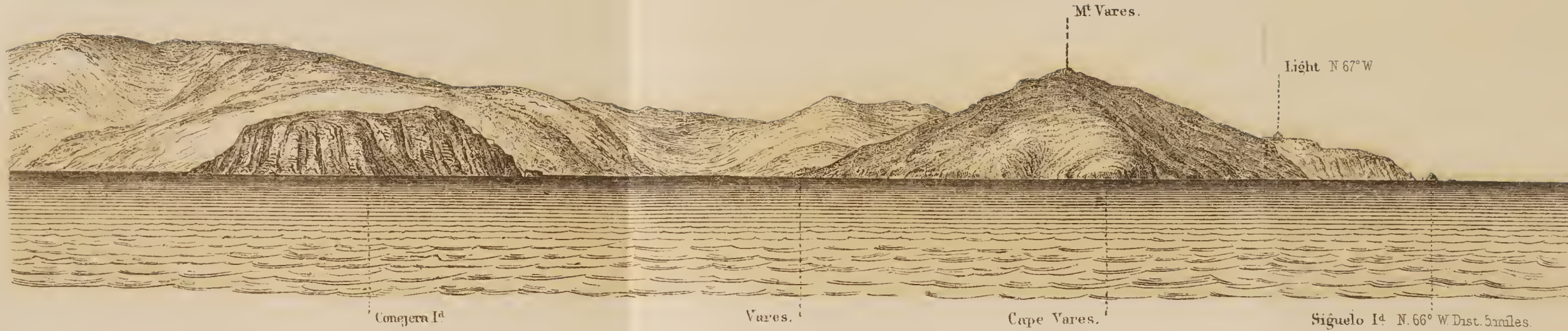
South of Conejera island, on the main-land, are the points of Peña Rubia and Ventosa at the foot of a hill named Ventosa, 482 feet high, and with a lookout tower on its sum-

mit; the hill shows a high, steep, rounded, and broken front to the north. Thence the coast trends S. by E., still high and steep, to the little beach of San Roman, off which are some conical rocks, named Los Castelos de Lagnete. There are 16 fathoms water 200 or 300 yards off the coast, and vessels sometimes anchor abreast the beach in SW. winds.

Socastro point. Socastro point, or Testa de Castro, the western point of entrance to Vivero inlet, is a rather low, bluff promontory, with a few detached rocks at its base, the foot of the long slope of a hill 2 miles inland.

Port Vivero. The entrance to Vivero inlet is between Socastro point on the W. and Faro point on the E., the latter being 1 mile ESE. from the former. Though not so wide, this inlet is as deep as Barquero inlet to the S., and offers good shelter from winds from S. to N. through W., along its western shore, and from those from NE. and E. under the eastern. The soundings are less than in the Barquero, and the head of the inlet is gradually shoaling with sand. It is chiefly resorted to by vessels driven to the eastward of Barquero in westerly gales, and as the inlet extends almost directly S., and as under the land the squalls are not so strong as in the latter, more sail can be carried and the anchorage may be reached with fewer tacks, though the boards are shorter. The shores are clean, bold, and safe, all dangers off them showing above water. The soundings decrease gradually from 12 fathoms at the entrance to 3 fathoms near the head of the inlet, with bottom generally of fine sand, except in the concha or bay of San Juan, where it is sand and mud, excellent holding-ground. Vessels of 10 to 12 feet draught go, at high tide, as far as the bridge of Vivero, using the channel kept open by the tidal currents and the waters of the Landrove river; but they are stranded at low water, unless in a deep place by the bridge, where there are always 6 to 9 feet water, and where there is room for half a dozen vessels. Large boats can get to Landrove village, about 3 miles up the river.

Gabeira islet. Gabeira islet, a little within point Socastro, is of moderate height, and between it and the shore there are $5\frac{1}{2}$ to 7 fathoms water in the middle of the channel, which is half a cable across, and may be used in case of necessity.



South of Gabeira islet, and 6 cables distant, is Caballo point, with a spacious bay between; in the bay there are two beaches, the larger being named Abrela. It is exposed to NE. winds, but coasters anchor off it in winds from S. to W. when they cannot work farther in. The beach is clean, the depth increasing gradually from it to 10 fathoms between the island and the point.

Caballo point.

From Caballo point the coast makes a short curve to Queimada islet one-fourth of a mile farther S. The islet lies close to the land. Thence the coast trends to the SW. and S., forming the bay of San Juan, or Concha de San Juan, so named from the village of San Juan de Coba on its shore. Within the bay and close to the shore are a number of detached islets and rocks, one of the former, La Insua, limiting the bay on the S. Here is the best anchorage for large vessels in the winter, as it is sheltered from all winds. Coasters anchor well in under the land; large vessels farther out, about 2 cables off shore, in $4\frac{1}{2}$ to 5 fathoms water, sand and mud, with Caballo point in one with Gabeira island. In summer anchorage may be taken nearer the middle of the inlet in 5 to $5\frac{1}{2}$ fathoms, with the most salient point of Queimada islet just touching the eastern side of Gabeira islet, and point Puntal in one with the southernmost houses of old Cillero. In both of these positions vessels should ride to a long scope on account of the sea that rolls in.

San Juan bay.

The southern limit of San Juan bay is the islet of Insua and some steep rocks, named Castellos del Grallal. Thence commences a sandy flat, which extends about 6 cables to the S. and then 8 cables eastward, as far as Lavandeiras bay, obstructing all the head of the inlet. It is named Grallal beach, and is gradually extending northward; its breakers reach, at times, the parallel of Cillero village. At low water it is almost uncovered, only a few little channels being left open. The town of Vivero stands on the eastern shore at the head of the inlet, and at the foot of mount San Roque, 1,230 feet high. It has a population of about 2,500, and is connected with the opposite shore by a bridge of twelve arches, continued farther by a causeway 2 cables long.

Grallal beach.

Vivero.

Just inside the bridge the inlet is about 3 cables wide, and this is an excellent place for small craft to careen for cleaning the hull. The Landrove river, after watering a

very fruitful section to the southward, empties here, and in winter is a very considerable stream. There is a mole at Vivero where the coasters discharge, and small coasters, with numerous fishing-vessels, belong to the town, and are built here.

Cillero.

From Vivero a high, winding, and, in parts, precipitous shore runs N. 1 mile to the village of old Cillero, built on an eminence jutting out into the sea, which separates Lavandeiras bay and beach on the south from the smaller port and beach of Cillero on the north. On the shore of the former is new Cillero, with storehouses and establishments for fish-salting. The inhabitants are almost all fishermen. Lavandeiras bay is obstructed with sand, so as to be almost dry at low water.

Bar.

The bar at the entrance of the channel leading to Vivero is between the eastern extremity of Grallal beach and point Peña de las Concas, the most projecting point of the cliff on which Cillero stands. Close off this point is a rock, named Sereni, sometimes covered, which it is necessary to pass close aboard in entering the channel. As the bar is of shifting sands, it is necessary to employ the services of one of the fishermen of the village as pilot in entering with a vessel of 9 or 11 feet draught. The pilot charge is 30 reals. The greatest depth on the bar at high water is 12 feet.

Large vessels wishing to communicate with Vivero can anchor in summer in 4 or 5 fathoms, at about 1 cable from the entrance to the channel; but this position is unsafe in winter.

From point Puntal, limiting port Cillero on the N., the coast, high and steep, trends northward, and, bending gradually to the NE., forms the spacious bay of Area, with the beach of San Julian at its head. Area islet, rather larger and higher than Gabeira, is in the northern part of the bay, at about 100 yards from the shore. The channel between is almost filled with rocks, leaving only a narrow boat-channel, with 2 to 3 fathoms water.

Monte Faro.

A conical hill, called monte Faro, the height of which is given by different authorities as 546, 664, and 716 feet, forms the northern and eastern limit of Vivero inlet. Its isolation and regular form make it easy to recognize, and it is an excellent landmark in making the inlet. The ruins of a

lookout tower are on its summit; its slopes fall gradually to the sea, and terminate in the NW. in Faro point, clean and steep-to. Between it and Gabeira islet there are 11 to 13 fathoms water.

Good water is plentiful in the inlet of Vivero, the chief springs and brooks being at Vivero and Cillero and at the beaches of Lavandeiras and Grallal. Provisions can be obtained at reasonable prices, and workmen for necessary repairs. Resources.

It is high water, full and change, at the bar of Vivero at 2^h 30^m; springs rise 11 to 12 feet, and neaps 8 to 9 feet. With strong winds from SW. or NW., the water rises 4 or 5 feet above its usual level; and with those from NE. and SE., it is depressed 3 feet below it. The stream has a velocity of 3 miles in the channel, and 1½ miles in the middle of the inlet. Tides.

It is usual for vessels to try to make Vivero inlet when bound for Barquero with strong SW. or NW. winds, if unable to fetch the latter, or, having entered, if obliged to leave it on account of loss of anchors or dragging. In such cases the coast should be kept close aboard, and the channel inside Conejera island used if possible. Once inside Caballo point, the anchor may be let go in 8 fathoms, veering to 70 or 80 fathoms chain; the holding-ground is good. In coming from the E. with easterly winds, a vessel should keep well inshore, as well, and pass Faro point close-to, and if then unable to enter the inlet endeavor to enter Barquero, using the Conejera channel if practicable. The advantage of Vivero is the clear and tenacious holding-ground, the only precaution advisable being to sight the anchors from time to time, to prevent their sinking so far as to render it difficult to get under way promptly. Sometimes vessels prevented by strong southerly winds from taking either inlet, anchor in 12 to 14 fathoms, off the beach of San Roman, to await a change; or, keeping the land close aboard, run to the eastward toward cape Morás, and keep under sail between Saiñas and San Cipriano points, where they find less wind; or they anchor in the bay of Lago. Directions.

The proximity of Barquero and Vivero inlets is of great advantage to vessels seeking shelter from southerly gales in the winter season. Those from the W. coast of Spain

should keep the land well aboard from cape Ortegal, and be prepared for heavy squalls and eddy winds off the land. If prevented by the latter from making the anchorages of Vares or Campelo in Barquero, they can still reach Vivero by passing close outside of Conejera island; or, if practicable, inside of it, ranging the land so as to round Socastro point without a tack if possible, letting go as soon as the vessel is in 7 or 8 fathoms.

Có bank.

Socastro point cannot be rounded close-to in a NW. gale, on account of a rocky bank named the Có, lying E. of it, on which the sea then breaks, and the whole extent between it and the point is then covered with breakers. The least depth of water on the bank is $6\frac{1}{2}$ fathoms at about 3 cables from the point. The Có lies nearly N. of Gabeira islet, with the Castelos de Laguete rocks off the beach of San Roman in one with Socastro point, and the Castelos del Grallal in line with the W. side of the inlet.

To pass outside the bank, keep the summit of the hill forming cape Vares in the middle of Conejera channel, until the Castelos del Grallal are open of the W. shore of the inlet. There are 14 fathoms a short distance outside the bank.

Lage Bank.

Another bank, called the Lage, less dangerous on account of the greater depth of water and its nearness to the shore, lies 1 cable SW. of Faro point.

Marks.

Vivero inlet is easily recognized from whatever direction it is approached. When approaching it from the westward, Estaca point, cape Vares, and Conejera island successively present themselves; from the E. the Farallones of San Cipriano, Anzaron island, and the unmistakable monte Faro are made; and in approaching from the N. the break in the coast-line is a guide until the marks already described can be seen.

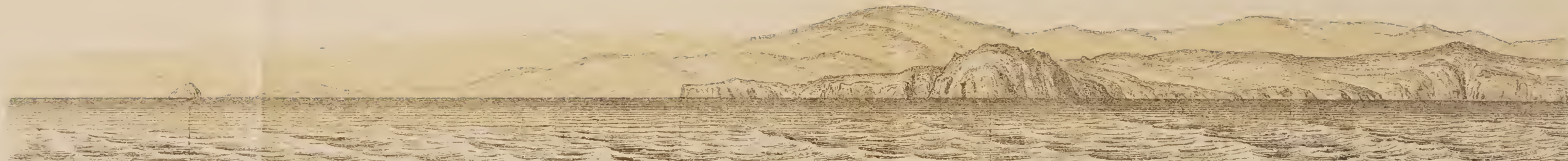
Saiñas point.

At 2 miles NE. from Faro point is point Saiñas, low at its extremity but rising inland; it is clean, and may be passed at a distance of 2 cables with safety. Between these points is a deep bay, named Esteiro, with a beach of the same name and some scattered buildings on the hillside inland. The whole bay is foul, and when there is much sea the breakers extend a long distance seaward.

Netos islets.

From Saiñas point the coast, high and rocky, extends

Nº10



Farallon S. 66° E.
/

Cape Moras.
S. 51° E. Dist. 5 miles

Anzaron Id.

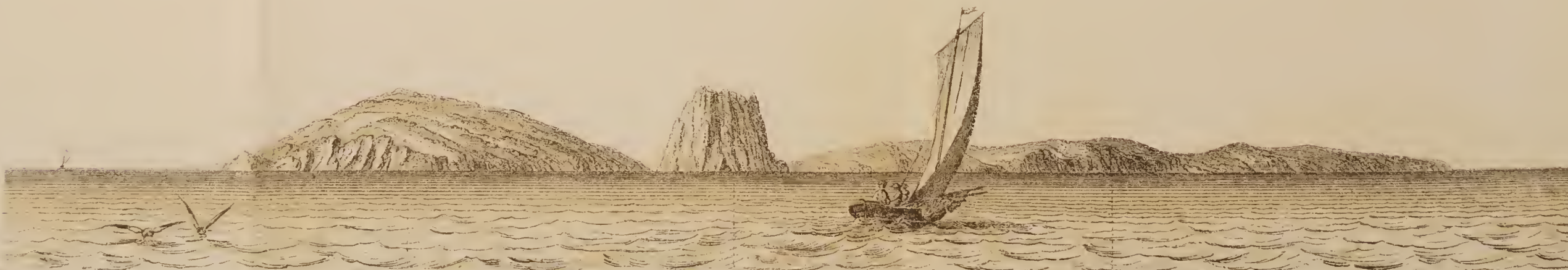
Nº11



Farallones N. 68° E. Dist. 2 miles

Pt. San Cipriano. S. 61° E.

Nº12



Sombriza

Pte. N. 48° E.

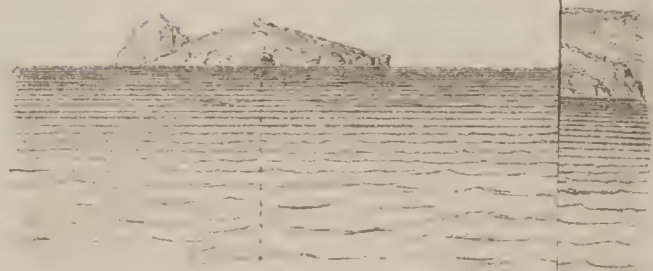
Baja

Nº10.



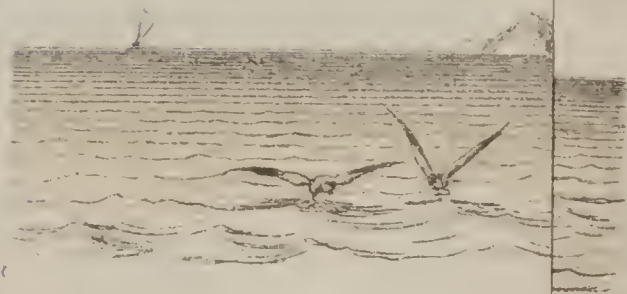
Farallon

Nº11.



Farallones N. 68° E. Dist.

Nº12.



ENE. three fourths of a mile to a point jutting to the N., off which are two islets, named Los Netos. Neto Grande, the larger islet, is about 20 yards off the point, and is high and steep; Neto Chico is 50 or 60 yards to the NE. of Neto Grande, and is lower and flatter. There is deep water in the channels between, and 6 or 7 fathoms close outside of them, with 30 fathoms at 2 cables, so that they may be passed at a prudent distance.

From the point of Los Netos a high and steep coast runs ENE. $\frac{1}{2}$ E. 1 mile to Roncadoira point, high, broken, and steep to seaward, with 23 fathoms water within half a mile of it. The coast between forms a bay, at the head of which is an islet close to the beach.

Between Roncadoira point and Anzaron island, a little more than 1 mile E. by S., the coast recedes to the southward, forming a bay of considerable size, named Reboira, at the head of which the Portocelo river disembogues; its mouth is very narrow, and only admits boats at high tide. The river widens within, but its bed is almost dry at low water. West of the mouth there are two islets, with a boat-channel inside of them, and the village of Vilachá is on a height overlooking the stream. Anzaron island.

Anzaron islet is high, rugged, and barren, presenting high, whitish cliffs to the northward, and sloping in a regular fall to the S. It is only about 12 yards from the coast, so that at a distance it is difficult to distinguish from the sombre lands of the main. It is clean and bold, having 8 fathoms, rocky bottom, close-to, and 20 fathoms at a short distance.

At $1\frac{1}{2}$ miles ESE. $\frac{1}{4}$ E. from Anzaron island is cape Morás, rocky, and rising in almost vertical cliffs 85 feet high. It projects to NE., and is commanded by heights attaining an elevation of 1,250 feet. There is an islet (*farallon*) at its foot, and half a mile NW. of it there is a shoal, named Canigreiro, with 13 fathoms water on it. The little village of Morás is on the western side of the cape. Cape Morás.

At $2\frac{1}{5}$ miles SE. of cape Morás is the Atalaya or look-out of San Cipriano. The coast between recedes to the SW. and forms a large bight, within which are four bays with beaches. The smallest of these and the nearest to the cape is named Portiño, and the next, which is also the largest San Cipriano bay.

and best, is called Lago, taking its name from a village on its shore. It is clear and navigable, with good holding-ground, and is protected from SW. and NW. winds. It is much frequented by coasters during SW. gales, and by vessels that in stormy weather have been unable to make either Barquero or Vivero, and it has the advantage of being easy to enter, and free from the heavy gusts of wind encountered in those inlets.

In entering from the W. with a S. wind, a vessel should first reach well over to the Farallones, and then work in to the anchorage by short tacks between the Farallones and the cape. In coming from the E. with easterly winds the land should be kept well aboard and the anchorage reached without a tack. The fact already mentioned that the SW. gales are least formidable between points Saiñas and San Cipriano, makes the Lago anchorage almost always easy of access. The best position for a large vessel is N. and S. with cape Morás and Pié islet (Farallones) bearing ENE. $\frac{1}{2}$ E., easterly, in 11 fathoms water, fine sand. Outside of this position there are patches of rock, and care should be exercised in letting go to keep clear of them. Smaller vessels anchor farther in, abreast a cove between the beaches of Lago and Portiño. If overtaken at this anchorage by a northerly gale there is little danger of dragging with good ground-tackling, for the rocky ground, with $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water on it, between the cape and the Farallones, breaks the sea considerably. If obliged to abandon the vessel the crew may be saved by running the boats into the cove above mentioned, under the lee of a salient point. If surprised by a NE. gale, which rarely rolls in a very heavy sea, get under way on the port tack, so as to weather the cape on the other board. There is no difficulty in passing between the Farallones and San Cipriano in depths of 11 to 13 fathoms.

Paraños beach. Beyond Lago beach there is a short stretch of rocky coast, followed by a smaller beach, named Paraños. It is not so clean as the former, and there are rocky patches off it. It is exposed to northerly winds.

Lieiro beach. After another short, low, and rocky extent of coast comes Lieiro beach, the nearest to San Cipriano. It is about the same size as Paraños and equally foul. Off both these

beaches, and in the greater part of San Cipriano bay, the bottom is of alternate patches of rock and sand.

Another low, rocky bit of coast separates Lieiro beach ^{San Cipriano beach.} from the beach of San Cipriano, on which is the village of Figueiras. Thence a neck of sand, about 100 yards long and 50 yards wide, extends NE. by N., and forms the isthmus of the little peninsula on which stands the village of San Cipriano. This peninsula is a mass of granite rock covered with a layer of sand and a sparse vegetation; rocky points project in every direction. To the northward it terminates in level ground, on which, at an elevation of 83 feet, stands the Atalaya or look-out. From the Atalaya Pié islet (Farallones) bears N. $0^{\circ} 55'$ E.; cape Morás, N. $44^{\circ} 14'$ W.; and cape Burela, S. $64^{\circ} 44'$ E. The village of San Cipriano is on rocky ground on the western side of the peninsula, and at high spring-tides and during NW. gales is cut off from communication with Figueiras, the isthmus being then overflowed. Population of San Cipriano, including the hamlet of Figueiras, about 400.

At 1 mile N. $\frac{1}{2}$ W. from the Atalaya of San Cipriano are ^{Farallones de San Cipriano.} three rocky islets, the group being called the Farallones. The largest, Sombriza, is nearly a quarter of a mile long ENE. and WSW.; it is rather low and narrow. Baja, flatter than the former, is half a cable to the southward; it is nearly as long, E. and W., and about 50 yards across. The most remarkable of the three islets, Pié, is an almost circular, inaccessible rock 83 feet high and of a reddish color. It is the first made out from a distance, and is a good mark when bound for the bay or port of San Cipriano. It is some 70 yards NE. by E. $\frac{1}{2}$ E. from Sombriza, and is separated from it by a channel, in which are many rocks scarcely covered at low tide, but with $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water between. The channel between Sombriza and Baja is narrowed by reefs jutting out from the islands, is foul, and not navigable. Around all these islets, at a short distance, there are $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water, rock, and in the channel between them and the shore $6\frac{1}{2}$ to 13 fathoms, sand and rock. At a short distance to the eastward there are $16\frac{1}{2}$ fathoms water, shells, and at about 3 cables NNE. of Sombriza there is a rocky bank with 11 to 13 fathoms on it, only dangerous in a heavy sea.

San Clement
reefs.

Sombriza, the most westerly as well as the largest of the Farallones, lies $1\frac{2}{3}$ miles ESE., nearly, from cape Morás, and in the space between there is a rocky ridge or chain of reefs extending in a southerly direction, and called San Clemente reefs; the least water on it is $4\frac{1}{2}$ and $6\frac{1}{2}$ fathoms, and the sea breaks on it in N. and NW. gales. Small craft belonging to this part of the country use the channels between the reefs, even in heavy weather, when making the port from the westward. The best and deepest channel lies close to Sombriza, and to use it a vessel should give a berth of 2 cables to the W. point of the island. Another channel lies between the reefs and Cape Morás, but is inferior to the first; to use it a vessel should pass at about 1 cable from the cape.

Between the Farallones and the Atalaya the channel is navigable for all classes of vessels; a reef extends about 2 cables SE. from Baja islet, and there is a shoal 100 yards NE. from the Atalaya, but between these dangers, only formidable in very heavy seas, there is a deep, wide channel for vessels of the largest draught.

Port San Cip-
riano.

Port San Cipriano is contained between the beach on the W. side of the peninsula and Anzuela islet, which lies a little distance WNW. of the western point of the promontory. This islet extends about 150 yards ENE. and WSW., and at high spring-tides is almost entirely covered. At 1 cable N. of it there is a small cluster of rocks awash at half-tide, called Vendaval ledge. The port will scarcely more than accommodate five vessels of about 100 tons conveniently, and they must make fast to the rocks of the islet and lay out anchors to the southward. The depth is 3 to $3\frac{1}{2}$ fathoms, sand and weed, and with winds from the NW. quarter the port is only protected from half-ebb to half-flood, as at high tide a considerable sea runs over the islet. If overtaken here by a NW. gale the vessels are generally secured as well as possible and the crews are landed. Vessels of 200 tons load here during the summer season.

San Cipriano
river.

The little river of San Cipriano empties into the port S. of the islet, but the shallow and shifting sands of the bar allow only vessels of 8 feet draught to enter. Once inside, however, they are sheltered in all weathers, with the sole inconvenience of lying aground at low water on a bottom

Atalaya

San Cipriano.

Figueiras.

Point San Cipriano

Atalaya of San Cipriano. S. 20° W. Dist 4 miles.

Farallon

Point Barela S. 53° E. Dist 6 miles

Point Juan Mariño.

of soft mud. This little river port is busily engaged in lading and unlading, careening, repairing, and building vessels; it owes much of its importance to the iron-works of Sargadelos, 3 miles inland. There is a custom-house here of the fourth class, and a small garrison.

Good water may be obtained from the river above the bridge, and better from the spring of Lieiro; but the latter gives more work in loading the boats. Provisions are scarce, and if desired in any quantity, must be obtained from Vivero, 6 miles away. Water.

It is high water, full and change, at port San Cipriano at 3^h. Springs rise about 11 feet, but are more or less affected by the direction of the wind. Tides.

On the north extremity of San Cipriano peninsula, there is a light-gray granite tower, with white lantern, from which there is displayed, at an elevation of 121 feet above the sea, a *fixed white* light, visible 9 miles in clear weather. The tower is 29 feet high, and adjoins the north front of the keeper's dwelling. Light: Lat. 43° 43' N.; long. 7° 28' 31" W.

When bound for San Cipriano, and coming from the eastward, steer for the Pié until the channel east of Anzuela islet opens, and then pass between the peninsula and the Farallones. In coming from the westward, make cape Morás and then head for Lieiro beach, passing between the cape and San Clemente reefs to take the channel W. of Anzuela. If there is much swell it is better to pass between the San Clemente reefs and the Farallones, where the channel is wider and deeper. Directions.

There are two channels into the port, the one east, the other west, of Anzuela. The former is clear of rocks, and is generally taken, the mark through being the eastern point of Baja on with the Pié astern. The western channel is wider, but foul, and to enter it with a 100-ton vessel it is necessary to head for Lieiro beach, and when at half a cable from it keep along the shore at this distance until inside.

In entering with a heavy sea on, sufficient sail must be carried to keep good steerage-way, and all preparations should be made for letting go at once as the port is so small.

If the pilot-signal be made, one of the sailors or fishermen will come out at once to bring the vessel in. There are no Pilots.

regular pilot charges. Boats from the town are always ready to render any assistance that may be needed.

Leixon del Nordeste.

East of the peninsula of San Cipriano the coast forms a little bay, named Caosa, off which are some rocks, the farthest out and most dangerous being called the Leixon del Nordeste, (NE. ledge,) half a mile S. 72° E. from the Atalaya. Vessels working along the coast, therefore, should not pass to the southward of the parallel of Atalaya point.

Portelo.

A little farther E. of San Cipriano is a little bight, obstructed by rocks, named Portelo, only used as a port for boats. A brook empties at the head of the bight.

Somonte point.

Proceeding eastward from cape Morás, the coast grows constantly lower, and is backed by high, mountainous lands. The low projecting point of Somonte is nine-tenths of a mile S. 62° E. of Atalaya point, and the coast between is fronted by rocks, so that the sea breaks a considerable distance out, making it dangerous for vessels to approach.

This is followed by the lower, cleaner point of Juan Mariño, on each side of which there is a little bight and a small stream.

Point Burela.

A low, level shore continues to point Burela, 4 miles S. $64^{\circ} 40'$ E. of Atalaya point. It is generally rocky and foul. A high, white beach, named Marosa, shows just at the point, and is a good mark for it. Burela point is low, rocky, and steep, and of a reddish color; it projects to the NE., and is the termination of a high mountain with rather a flat summit, called by the seamen of this coast Roñadoira. In fine weather the point may be passed at the distance of 1 mile, but in rough weather it must be given a wide berth, as the foul ground causes the sea to break a long way out. The village of Burela, from which the point takes its name, is scattered along the shore of port Burela, which follows the point to southeastward.

Gulf of Foz.

From Burela point the coast trends southeastward, forming a bay 19 miles across and 5 miles deep, named the gulf of Foz, more generally known among the coasters as the gulf of Masma, from the river of that name which empties into Foz inlet, the eastern limit being Tapia islet and the adjoining reefs. The shores are usually rocky and the bottom foul, so that with on-shore winds there is a dangerous, broken sea, and it is much dreaded by mariners during the

winter season. When the wind is from SW. outside it is from the S. in the gulf, with heavy squalls that necessitate great care in carrying sail. With winds from W. to E. through N., there is much sea, and all precaution must be used not to get embayed. A berth of 2 miles should be given this coast in fine weather, and 3 miles should there be any sea.

The prevailing winds in winter, in and about the gulf, are southwesterly. If, outside, it is blowing from SW. to WSW., it is blowing hard inside from S. to SSW., with heavy squalls; and with an east wind outside there is a southeasterly wind in the gulf. The violence of these winds extends for 12 or 15 miles, beyond which they become more steady. Occasional winters have occurred when the SW. gales have lasted for one or two successive months, almost without interruption, but they rarely exceed four days. With gales from N. or NW. a heavy sea sets upon the coast, so that nearly the entire space between the entrance points is covered with breakers, and sometimes all the ports are closed in consequence. Occasionally this NW. swell sets in without apparent cause, and during the finest weather.

Winds.

In summer the *vendarales* are less frequent, the prevailing winds being then from the NE., and lasting sometimes a fortnight or three weeks. Occasional winds from the SE. quarter bring clouds and rain; these winds haul to S., W., and NW., clearing at W. There are generally land-breezes in the gulf, especially about the inlets and in their vicinity, blowing during the night and until 9 or 10 a. m., when the NE. or NNE. breeze sets in and lasts until evening.

The SW. gales, or *vendarales*, are the worst, bringing thick weather and almost uninterrupted rain. West and WNW. gales in winter blow with frequent and heavy squalls and considerable rain, but clearing occasionally. NE. winds generally blow clear.

Fogs are frequent in June and July, being brought from the English channel to the coast by the NE. winds. They usually last 3 or 4 days.

Fogs.

At Rivadeo a NE. wind is prognosticated when mount Mondigo is covered with fog or light clouds, and the coast in the vicinity of San Cipriano is obscured; but when

mount Mondigo and the coast are clear a westerly wind may be expected.

Currents.

During the summer constant currents, setting W. and NW., are experienced, according to the contour of the coast and the distance off it. Tidal currents extend but a short distance out, and set W. with the ebb and E. with the flood. From June to September the current is strongest, setting WNW., with a velocity of about 2 miles when the wind is steady at NE., particularly about the Orria de Tapia and point Burela. In winter, on the contrary, the currents set eastward, and, near point Burela, SE., to the head of the gulf, with about the same velocity when the wind is north-westerly. From the above the necessity of great care is evident in the navigation of these waters, especially in unsettled weather.

Chacinciras islets.

Less than 100 yards N. 30° W. from Burela point are the Chacineiras islets, appearing as three islets at high water, but forming a single island at low tide. They are surrounded by reefs, and in the channel, between them and the shore, the depth is scarcely more than 2 fathoms.

Piedra de Burela.

Another small steep islet, named Piedra de Burela, lies about 300 yards SE. $\frac{1}{2}$ E. from the point, and is connected with it by sunken reefs, on which the sea breaks when there is much swell. Inside the rock, over the reefs, are 2 to $3\frac{1}{2}$ fathoms water, and a short distance outside of it 7 to 8 fathoms. If obliged to pass inside, a vessel should keep nearer the rock than the shore. At high tide this islet looks like a boat.

Coast.

A little more than 2 miles SSE. $\frac{1}{4}$ E. from Burela point is point Areoura, at the eastern extremity of the beach of the same name. The intermediate coast is low and foul, with reefs and rocks lying off it; it forms a bight named port Burela, only used in summer by coasters, who come to load with moulding-clay for the Sargadelos iron-works. Point Areoura is low and rocky, and is followed by a stretch of low, broken coast, extending 1 mile to point Nois, the extremity of a rugged promontory, extending to northeastward. Between these points a rocky islet, named Orjal, lies close to the shore. In the elbow on the south side of Nois point fishing-vessels take shelter during SW. winds, and the village of Nois is scattered over the plain from which the point projects.

M^t Ronadora.

Farallon

N^o 16.

Cape Burela N. 54° W. Dist. 7 miles

M^t Mondigo. S. 28° W. Dist 15 miles.

N^o 17.

Gulf of Foz.

N^o 18.

Rubia Istet

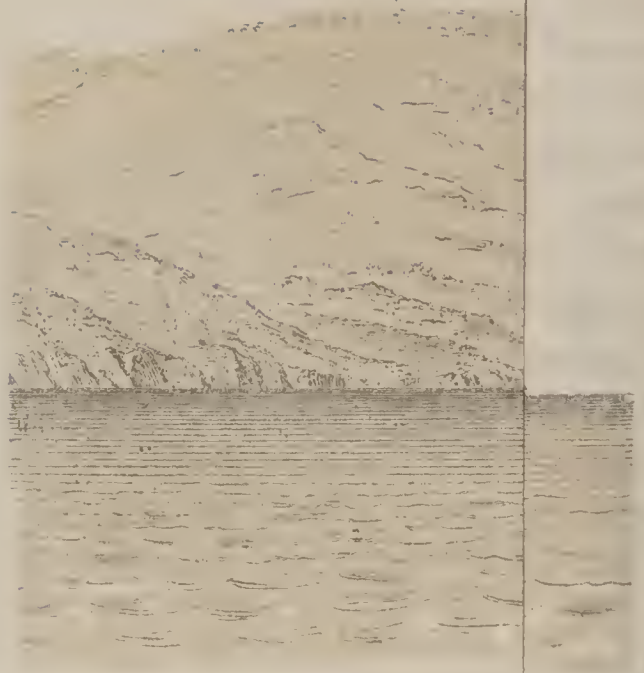
Entrance to Foz inlet

Pont Escairo. S. 12° W. Dist. 2 miles.

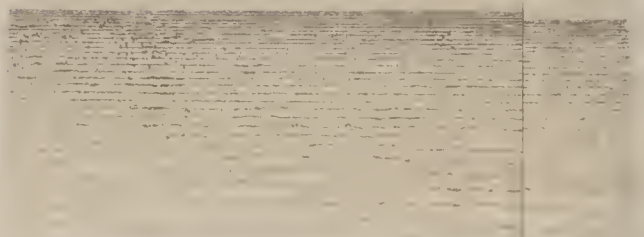
Marsau

M. Rond

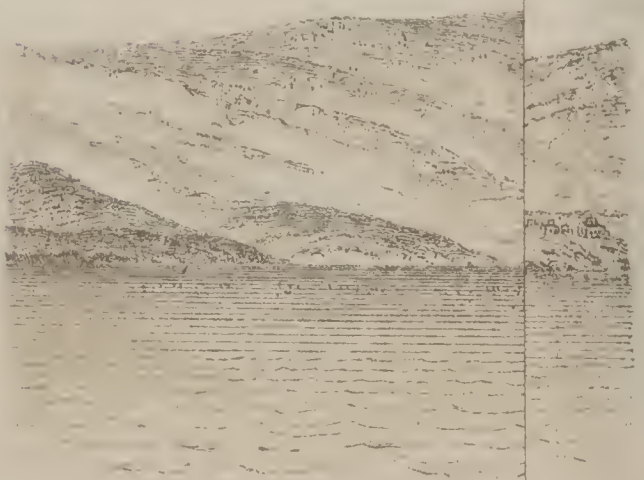
Nº 16.



Nº 17.



Nº 18.



Off the beach of Area Longa, which is half a mile long, and commences a little S. of point Nois, there is good anchorage for coasters in SW. winds. Like all the preceding, point Fasouro is low and rocky; between it and Villarmea point, distant 1 mile, is Fasouro beach, hardly so large as Area Longa, and in the middle of it the Oro or Fasouro River falls into the sea, by the village of the same name. Small coasters only can cross the bar of this stream at high water.

Point Villarmea is low, projecting, and rocky; thence follows a long beach, with scattered boulders, that terminates at Point Marzan, less projecting than the former.

The coast all along is backed by high, mountainous land, spurs of the Gistral Mountain, that attains an elevation of 3,395 feet. The nearest to the coast are the peak of Tres Mujeres, 3 miles WSW. of Areoura point, 1,635 feet high, and mount Cabaleiros, $3\frac{1}{2}$ miles WSW. of port Burela, which rises to 1,670 feet.

A short stretch of coast of sand and rocks follows point Marzan, and just before reaching Escairo point there is a short, foul beach and a group of rocks, covered at high water, both named Las Lobas. These rocks lie along the coast, and reach almost to point Escairo.

Point Escairo, $7\frac{1}{2}$ miles SE. $\frac{1}{2}$ S. from Burela point, is low and even, forming a plain about three-fourths of a mile across, and terminating at the foot of a small hill named Coto de Castro, 220 feet high, the pines on which form an excellent mark. Escairo rock, 46 feet high, lies close off the extremity of the point, and shows a steep, black face to the N., and two islets, of the same height, are a short distance off the NW. side of the point. This point is the NW. limit of Foz inlet, the entrance to which is about 450 yards across.

Foz inlet is spacious, but so entirely obstructed by sand that it is dry at low water, except in some channels and small holes, where there are 1 and 2 fathoms water. The spring rise being about 11 feet, only vessels of 10 feet draught can enter, and it is solely frequented by a few coasters in the summer season to obtain cargoes of grain and wood. In winter it is practically deserted, and as the bar is at the immediate entrance of the inlet, there is no sheltered anchorage while waiting for a tide. The channel is about in

the middle of the bar, but, as the sands are shifting, no directions can be given for entering. The fishermen act as pilots when desired.

The village of Foz, containing about 200 inhabitants, is on the western shore, and the Masma river empties at the head of the inlet.

Tides.

It is high water, full, and change at 3^h. Springs rise 11 feet.

Coast

From Prado point, the eastern limit of Foz inlet, the coast, backed by high land, runs E. $\frac{1}{2}$ N. nearly, for 9 miles, to Rivadeo. The most projecting points are Promontorio and Corbeira, both considerably prolonged under water by reefs. Between them are several small bends, with little beaches and scattered rocks, the cleanest beaches being one at point Prado, and one near Promontorio point. The Portelas islets lie close off the latter.

Beyond Corbeira point is point Piñeira, and between them is a little port, named Rinlo, with a little beach and a fishing-village at its head. It is completely open to on-shore winds.

Piñeira point is projecting, and is surrounded by sunken rocks, called the Longas. Beyond them the ground is foul, and they should be given a berth of 3 miles, in a heavy sea. Piñeira point, so called from the village of the same name near it, is followed by a broken coast, fronted by reefs and foul ground, extending to Pancha islet, at the western point of entrance to Rivadeo inlet.

CHAPTER II.

FROM RIVADEO INLET TO CAPE PEÑAS.

Variation in 1876.—Rivadeo Inlet, $20^{\circ} 55'$ westerly; Cape Peñas, $19^{\circ} 45'$ westerly.

Pancha islet, which has a light-tower on its summit, is about 275 yards in length NW. and SE.; is steep on all sides, and its summit is a plain 54 feet above sea-level. It is separated from the W. point of entrance to Rivadeo inlet by a passage 55 yards wide, which is almost dry at low water. A reef extends from the islet to the NW., and a berth of 2 miles should be given it in fine weather, and 3 or 4 miles with a heavy sea.

There is a tower on the keeper's dwelling, 29 feet high, on the summit of Pancha islet, from which there is displayed, at an elevation of 79 feet above the level of the sea, a *fixed white* light, visible 9 miles in clear weather.

Pancha islet and Cruz point lying nearly E. and W., form the limits of the entrance to Rivadeo or Ribadeo inlet, a little more than half a mile across. This beautiful inlet, which not long ago was an excellent port from the facility of taking it, is, at the present time, so much obstructed by sand-banks as to make it difficult to enter with a large vessel and scant winds. Carabela bank, constantly advancing toward Carrayas ledge, narrows the channel, so that extreme caution is necessary in working through, and within, much of the best sheltered portion of the port is dry at low water.

Carrayas ledge, 5 cables SE. $\frac{3}{4}$ E. from Pancha islet, is a dangerous ledge of rocks lying just N. of Castrelius point, most of them awash at low water, with 5 fathoms water close outside.

About 2 cables S. of Castrelius point is the castle of San Damian on a high, steep point; and a little off shore of it is Carballo rock, 55 yards from the most projecting point of land, a danger that only uncovers at low water. A little farther N., but only 20 yards from the shore, is another rock, named the Viga.

Rivadeo.

South of the castle of San Damian, a steep, broken shore trends S. $\frac{1}{2}$ W. for a short distance, to the town of Rivadeo, which takes its name from the river Eo, which empties at the head of the inlet. The town, containing about 3,000 inhabitants, is built on the level ground at the brow of the cliffs overlooking the port; vessels moor abreast the cliffs and off the coves of Escabana, Porcillan, and Figueirua, where there are small beaches and moles for discharging. This port, more mercantile than agricultural in character, owns 69 vessels of all sizes, and numerous fishing boats, with a gross tonnage of 5,946 tons.

About 4 cables within the town there is a little bay, easily convertible into a good harbor, where there are a few store-houses and other buildings, called Villa-vieja. Vessels of all classes are built here, and the bay is sometimes used as a careening place. The bottom is mud.

Castropol.

South of Villa-vieja the inlet is narrow, and almost completely obstructed by the sands. Opposite it, on the eastern shore, is the town of Castropol, on the point of the same name, and in the province of Oviedo. Population about 800. The town of Vega and the village of Abres, of some little commercial importance, are farther within the inlet, and can only be reached at high water by vessels.

From Castropol point the eastern shore bends to the E. to form the spacious bay of Figueras, 1 mile deep, at the head of which is the dock-yard of Liñeira. In this bay most of the ship-building and careening is carried on, on account of the excellent shelter and commodious port, and because of the proximity to the store-houses and workshops. The bay dries at low water except in some channels. The village of Figueras is at the NE. part of the bay, and E. of Rivadeo. It is built in the form of an amphitheater, and is the residence of the most experienced pilots, who look out from the Atalaya tower, 159 feet above the sea, on Boy point, NW. of the village.

Carabela bank.

Boy point is the northern limit of Figueras bay; 150 yards farther N. is Pasado point, the promontory between the two narrowing the entrance to the inlet to 3 cables. From this promontory Carabela bank extends N. by W. toward Carrayas rocks, on the other shore, and is daily increasing, and threatens to close the entrance to the port;

Atalaya of S. Roman. S.

Hivideo.

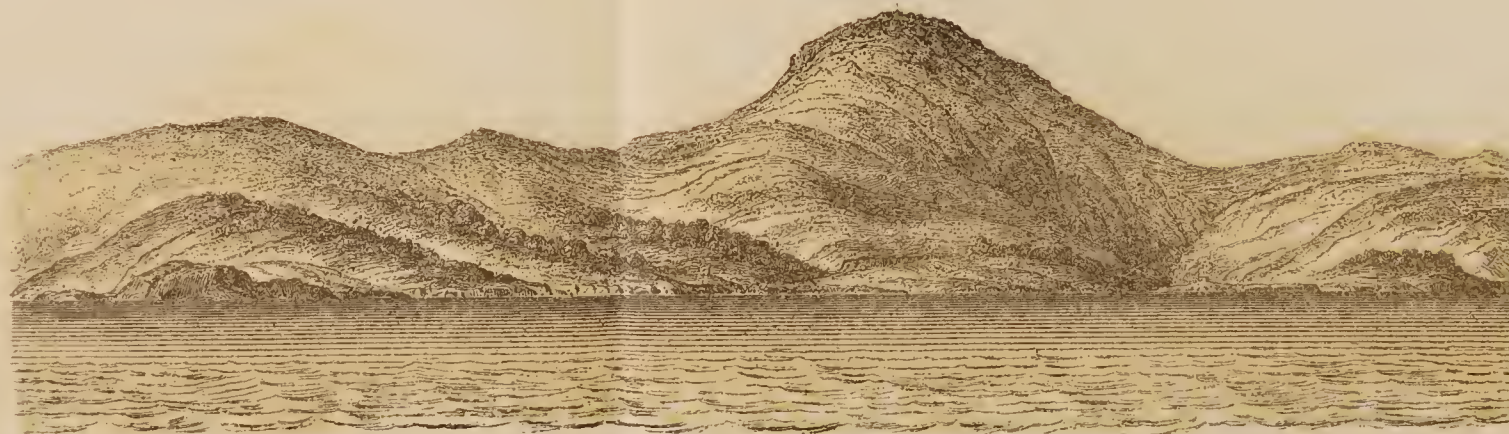
Pancho I^a Light. S. 55° W Dist. 2 miles

Nº 19.



M^t Mondigo. S. 23° W from 3 miles off Shore

Nº 20.



Church of San Sebastian.

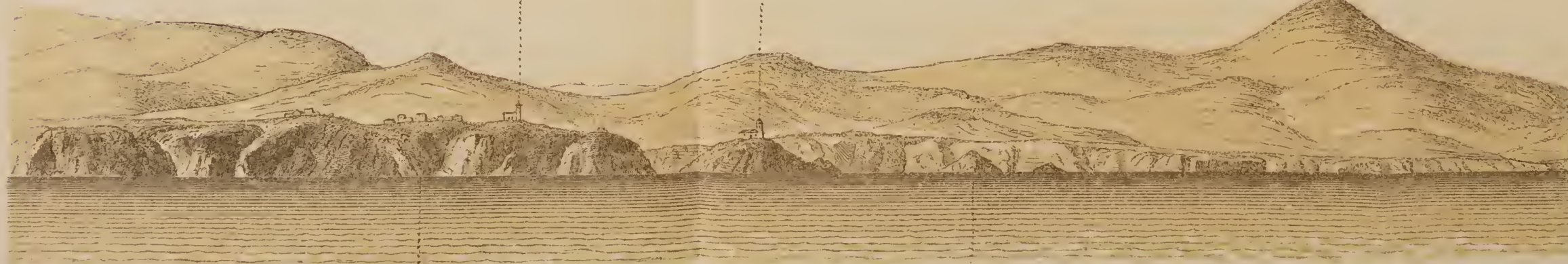
Tapia Light. S. 46° W. Dist. 3 miles.

M^t Mondigo

Nº 21.

Tapia.

Orrio de Tapia Islet.



it has 6 to 14 feet of water on it at low tide, and at present the channel for large vessels between it and the rocks is scarcely 100 yards across.

Nearly a mile N. $\frac{3}{4}$ E. of Pasado point is point Cruz, the coast between forming Arnao or Yam bay, $3\frac{1}{2}$ cables deep to the eastward, with good anchorage in 6 and 7 fathoms over a clean sandy bottom. Vessels anchor here in moderate weather to await the tide for entering, or when ready for sea. Arnao bay.

Cruz point, the eastern limit of the entrance to Rivadeo inlet, is the extremity of an arm of land terminating in broken cliffs and detached rocks, with a reef extending off some distance in a northerly direction. About 3 cables NE. of Cruz point is Rumeles point, with a reef of the same name extending about 2 cables NNW. The ground in the vicinity of both points is foul. Cruz point.

A rocky ledge, named the Arredo bank, lies N. $62^{\circ} 25'$ W. from Cruz point, and N. $61^{\circ} 57'$ E. from Pancha islet. The Spanish sailing-directions give the least water on it as 7 fathoms at low springs, and say it is only dangerous in heavy weather. British Admiralty chart No. 78, (*plan*,) however, shows one sounding of $4\frac{1}{4}$ fathoms on the eastern side of the bank. Arredo bank.

Panchorro bank is a dangerous rock lying N. $78^{\circ} 10'$ W. of Cruz point, and 1 cable N. $25^{\circ} 35'$ E. of Pancha islet. There are scarcely 2 fathoms water over it at low spring-tides, and the sea always breaks on it. This ledge and the Carray's rocks are the greatest dangers in entering the port. Panchorro bank.

The approach to the inlet is clear of danger. There are 16 and 17 fathoms within half a mile of the entrance to the inlet, 10 and 12 fathoms between the banks above described, 8 fathoms between Pancha islet and Cruz point, and $4\frac{1}{2}$ fathoms by the bar at the entrance to the port. Beyond this point the greatest depth is in the channel near the western shore. The larger vessels, when moored near the shore, are aground at low water. The bottom in and near the inlet is of sand, with occasional patches of rock near the entrance. Soundings.

The time of high water, full and change, is 3^h; springs rise ordinarily 13 feet, with an increase of 2 or 3 feet with Tides.

SW. and NW. winds and a corresponding decrease with NE. and SE. winds. The mean velocity of the stream is about 3 knots.

Resources. The best and most plentiful supply of water is at Castropol. It is obtained from a covered fountain, where a boat may load in a very short time, but it can only be reached at high water. Abundance of good provisions may be obtained at Rivadeo at reasonable rates. Repairs to either hull or rigging may be effectively undertaken, as material and navy-stores are plentiful and of good quality.

Pilots. The pilot-service is well organized, and the pilot-boats assist in mooring and unmooring. Pilot-fees, between March and September, are 45 reals for the pilot and 40 for the boat, in entering; 35 reals for the pilot and 30 for the boat in leaving the port. For the rest of the year these sums are, respectively, 60, 48, 48 and 40 reals. The boat should carry eight men and a cockswain. If more boats are employed they are similarly paid. No vessel should enter without a pilot unless locally familiar.

Directions. The channel into Rivadeo lying N. and S., and being very narrow, makes it difficult to take with winds from the S. It often happens that a vessel nearing the inlet with a NW. wind will meet a breeze blowing out at the entrance. To enter under such circumstances requires a rising tide and great promptness and circumspection in tacking, for the tide sets directly on to Carabela bank, which breaks with any sea, and should a vessel miss stays when near it, there is no room to anchor, and the loss of the ship is inevitable.

Coming from the westward with southwesterly winds, the Farallones of San Cipriano should be made; thence run along the coast at a distance of 3 or 4 miles, if there is any sea, until abreast of point San Miguel, when near the coast to 2 miles with smooth water, or 3 miles with much sea, until clear of the Longas off Piñeira point, when endeavor to make out the chapel of Santa Cruz, a white, quadrangular building, on a hillock on the eastern slope of mount Mondigo, SW. $\frac{1}{2}$ S. from the entrance. Keep this chapel in sight above the cliffs of the coast until abreast Pancha islet, when head for the middle of Arnao bay until Cabanela or Deshonra-Buenos point, the most projecting point E. of Rivadeo, is on with the middle of the saddle formed by two

elevations of a mountain in the interior, called Cotos de Balboa. This bearing, S. by W., leads through the channel to the anchorage inside the castle of San Damian, and off the Escabana if the vessel draws 15 or 17 feet, or farther in and off the Figueirua if she draws 11 to 13 feet. At high water the western shore may be kept aboard after the Carrayas rocks are passed, giving it a berth of 60 yards, however, to clear the Carballo and other rocks. If the tide is low the shore about Poreillan must not be approached within $1\frac{1}{2}$ cables, on account of a bank that makes out.

Coming from the E. with NE. winds, the light-house on Tapia islet is a good mark to make. Thence keep along the coast at a distance of 2 miles to avoid outlying dangers, and enter the inlet between Cruz point and Arredo bank if the water is smooth, or between this latter and Panchorro bank, which is preferable with free winds. Then head for the middle of Arnao bay, and proceed as above directed.

If southerly winds are met at the entrance, a vessel should lay off-and-on or anchor in Arnao bay until the tide is running in strongly. A slow-working ship should club or tow through the channel, and not attempt to work in. Boats for towing are readily obtained.

With heavy N. and NW. gales, which are sometimes so severe as to close the port, a heavy sea sets upon the coast, and almost the whole space between the entrance points is covered with breakers, and it is well for vessels bound to Rivadeo when coming from the W. with bad or doubtful weather to make Barquero inlet, and remain there until the weather is clear. NE. winds do not send in so much sea, and with them the entrance is easy.

In approaching the inlet from seaward, mount Mondigo, 1,942 feet high, makes an excellent mark, and heading for its eastern slope leads direct to the port. The conical figure of this mountain, its isolated position, and the jagged rocks that crown its summit, make it impossible to mistake, and as it is neared, Tapia islet light, the Santa Cruz chapel, the pilot tower on Boy point, the towns, and, finally, the light-house on Pancha islet will be successively seen.

The best time for leaving the port is with a rising tide, and when it is at least two-thirds full. There is generally a land-breeze in the morning.

Vessels moor head and stern, with their heads to the southward to guard against the S. wind, which blows with great violence.

Province of
Oviedo.

The river Eo separates the province of Lugo on the west from that of Oviedo on the east, the latter being more generally known as the province or principality of Asturias. This has a sea-coast of about 180 miles with a general W. and E. direction, much broken and without a single considerable bay or good harbor for large vessels. It is fronted by reefs, islets, and rocks, which, although extending but a short distance off the coast, render it a very dangerous lee-shore with northerly winds and any sea. The coast all along is high, level, and precipitous, rising inland to the spurs of the Pyrenean range. The northerly winds of winter roll in a heavy sea and close the ports, and the S. winds blow with such fierce gusts that they are almost equally dangerous. The NE. winds of summer bring fine weather.

Castro bank.

Point Rumeles, which follows Cruz point, is low, broken, and projecting, with a dangerous reef jutting to the northward. About 20 yards outside these points are the Canucos rocks, dry at low water, with a boat-channel between them and the shore. The next point to the eastward is Rubia, steep, and of moderate height, with some islets close off it; and between 1 and 2 miles N. from it is Castro bank, with 11 to 13 fathoms water over it, and 25 to 30 fathoms on all sides. This bank only breaks with the heaviest seas, and is then an indication that Rivadeo inlet is closed.

Santa G ad í a
point.

Point Santa Gadía, which follows Rubia point, has the two Pantorgas islets off its northern extremity, and a short distance outside of them there are two rocks that dry at low water. Between Rivadeo and these islets the coast is steep, broken, and almost inaccessible except at the beach of Peña-ronda, near the village of Santa Gadía. This beach is clean, and has in its center a round rock, from which it takes its name.

Cape San Se-
bastian.

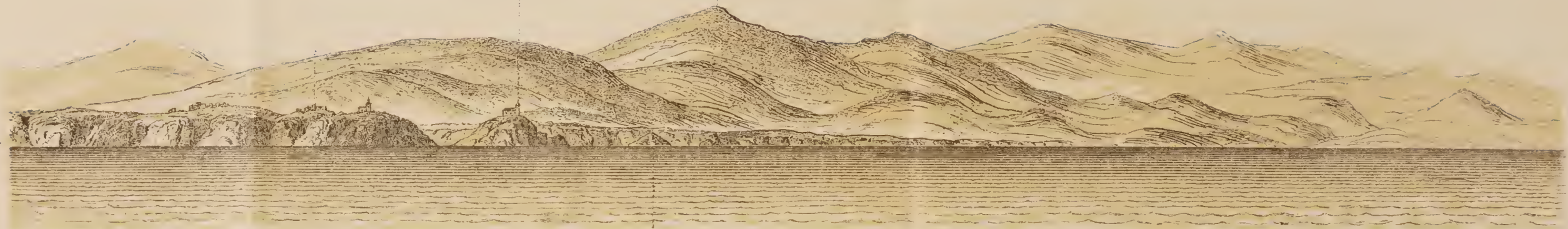
Beyond Peña-ronda beach is a small bay with a foul, rocky beach at its head, limited on the E. by point Carlongo. Thence a steep, rocky shore continues to cape San Sebastian, 4 miles eastward from Rumeles point. This cape or promontory has the chapel of the same name on its summit, and the village of Tapia is built on the slope of the

22.

Tápia

Tápia Light. S. 62° W. Dist. 5 mls

M^t Mondigo.

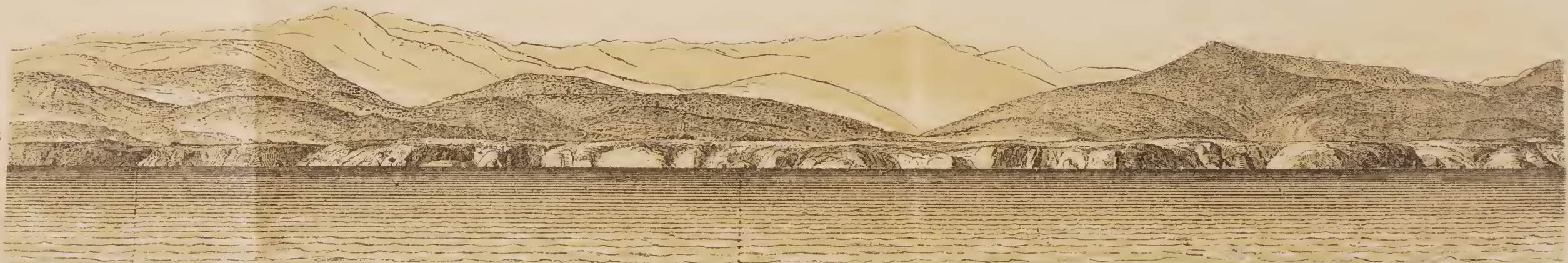


Orrio de Tápia.

Mc Pemonres.

M^t Jarrio.

23



Cape S. Augustin S. 47° E. Dist. 4 miles

Cavero Islet.

24.



Point Campell.

Navia Inlet.

Cape S. Augustin S. 53° W. Dist. 2 miles.

Ortiñera Cove.

N°22.



N°23



Cape S. Augustin S. 47° E. Dist

N°24.



Point Camp

cape and the shores of a little cove on its western side, sheltered from winds from the N., that forms a port for the small craft of the vicinity.

Off the northern part of the cape is Tapia islet, 165 yards long, 100 yards wide, and 62 feet high, with a light-tower on its summit. It lies only about 50 yards from the cape, with which it is connected by a reef that uncovers at low tide. Tapia islet.

Orrio de Tapia islet lies within 100 yards N. of Tapia, and is connected with it by a reef that is almost awash at low water. The Orrio de Tapia is round, conical, and low, and dangerous reefs extend a long distance from it to NNE., that chiefly dry at low water, and always show two rocks, that from a distance look like boats, named the Porcego-sas. There is deep water close outside the reefs, and a vessel may pass a mile northward of them without risk. Orrio de Tapia.

On the summit of Tapia islet, and attached to the keeper's dwelling, there is an octagonal granite tower with white dome, from which is displayed, at an elevation of 94 feet above sea-level, a *fixed white* light with a *flash every two minutes*, and visible 15 miles in clear weather. The light-tower is 32 feet high, and the illuminated arc cuts those of the lights of point Estaca and cape Busto, E. and W. of it. Light: Lat. 43° 35' 40" N.; long. 6° 58' 26" W.

From Tapia islet the coast is rather higher, ranging between 100 and 150 feet, and the land is nearly level for 2 or 3 miles inland, when it begins to rise until it forms the lofty ranges that characterize the province of Asturias. The sea-coast is of steep cliffs broken occasionally to form small bays in some of which there are beaches. Between Tapia islet and Forcada point, the next eastward, the coast bends to the S., forming Figueras bay, in which there is a foul, rocky beach. Porcia bay.

East of Forcada point the coast again bends to the southward and forms a deep bay, named Porcia. At its head the river Porcia runs through the middle of a beach. Small craft and coasters visit this river to load with wood and grain; but they have to take advantage of high tide in doing so, as the whole bed, except in a little channel, is dry at low water. To enter the river it is necessary to approach closely two large and connected islets, leaving them on the port hand in taking the bar. All the shores of the bay are

steep; its eastern limit is a high, rugged, whitish headland, called the Olga Mourina, or the Atalaya, and outside this is an islet, named Corbero.

Cape Blanco.

The Atalaya de Porcia is followed by a stretch of coast, rocky, steep, and whitish in appearance, to cape Blanco, so called from the white color of its western face. From a height of about 125 feet it slopes downward to the sea and terminates in a rocky point distant a little more than 4 miles from the Orrio de Tapia.

Port Viaveles.

About half a mile S. of cape Blanco is the mouth of the little port of Viaveles, difficult to make out at any distance on account of its narrow entrance, which is hardly 40 yards across at low water. This channel leads in for about 100 yards to a pool 50 yards across, and from this a channel or cut 18 or 20 yards wide runs in for 1 cable to the SW. At low water even the smallest vessels lie aground, and with on-shore winds a bad swell rolls in that is very severe on the craft inside as the tide is falling. The importance of Viaveles is due to the dock-yard, where many vessels have been built of late years; one of them was of 640 tons burden, but was got out with much difficulty. In heavy seas the mouth of the port is closed, breakers extending for some distance outside it. In coming from the W. the port is reached by keeping the land aboard after rounding cape Blanco, and in coming from the E. it may be recognized by mount Jarrio and the church of Caridad, S. of the port and 1 mile inland. The town of Viaveles is at the head of the port and only the few houses above the cliffs opposite the entrance can be seen from outside.

Tides.

It is high water, full and change, at Viaveles at 3^h; springs rise 13 feet.

Resources.

Water is easily obtained from the spring in the inner basin, that supplies the town. Provisions are scarce, but may be brought from Caridad or Porcia.

Coast.

From Viaveles the coast trends eastward 5 miles, to cape San Agustin, forming several breaks and bays in this extent, with a bold shore fronted by rocks. At 1 mile eastward from Viaveles is the bay of Pormenande, through the opening of which may be seen the town of Caridad and the church by a group of poplar trees. The shore is from 90 to 140 feet in height, rising 3 miles inland, to high mountains.

More than 1 mile outside of Viaveles there are rocky banks in 11 to 14 fathoms water, where the sea breaks when there is much swell. Farther out there are other banks with more or less water over them, one of them, named the Cabezo, being $2\frac{1}{2}$ miles NNE. of the entrance to port Viaveles. There are 23 fathoms on the Cabezo, but the sea runs high upon it, and it would be dangerous to attempt to pass over it in bad weather. Soundings around the bank are from 28 to 37 fathoms.

Torbas bay is the next eastward of the bay of Porme-nande; it is completely open to NNW., and is surrounded by cliffs; but at its head there is a small pebble beach, and coasters find shelter in it during the NE. winds of the summer. The eastern limit of the bay is point Acebros, prolonged by a reef of the same name that dries at low water; and a little farther E. is point Lamosas, or Engaramada. Off the northeastern part of the latter are the Gavieros islets, the largest one close to the shore, and the outside one sufficiently distant to permit coasters to pass inside of it in fair weather. More than 100 yards NW. by N. from the outer Gaviero is the Lamosas reef, which is partly dry at low water. It always breaks, and in bad weather the breakers extend a considerable distance. Coasters can pass between it and the outer Gaviero in fine weather, in 9 to 11 fathoms water. The reef lies NW. and SE.

Beyond the Gavieros the coast, inaccessible and fronted by rocks, bends southward to form the cove of Ortiguera. The shores are of high cliffs, and the cove, narrowing to the head, is only used by fishing-boats that haul up on a small pebble beach. The village of Ortiguera is scattered along the craggy declivities of the shores, and a brook empties at the head of the cove.

The eastern point of entrance to Ortiguera cove, and the western point of entrance to Návia inlet, is cape San Agustín, 111 feet high, and steep both to E. and W. On its summit, and about 100 yards from the extremity of the point, is the chapel of San Agustín, a good mark for the cape.

A small beach of black sand, named Arnella, is on the eastern side of the cape, and vessels anchor off it in moderate

SW. and NW. winds when waiting for a favorable tide to enter the inlet.

Návia inlet.

Half a mile ESE. of cape San Agustin, is the bar of Návia inlet, which is in reality only the mouth of the Návia river. This river is of great importance, as well from the abundance of oak timber that comes down it, as from its rich salmon fishery. The bar is always shifting, changing with every gale from seaward, so that no directions can be given for it, and no vessel should attempt to cross it without a pilot, who ought first to sound the channel if the vessel draws 9 to 11 feet, the greatest draught that can enter. It breaks constantly, and, being in the line of the coast, is exposed to all northerly winds; there is, moreover, a rock almost in mid-channel.

Once within the bar, good shelter from all winds is found, and at the anchorages of Vega de Arenas and Espin there are 11 to 17 feet water at low tide, so that vessels are always afloat; but when anchored abreast the town of Návia, they ground at low water. This town has about 800 inhabitants, and is built along the beach on the eastern shore, nearly a mile from the bar, the course of the river between being nearly N. and S. The latter is 300 yards across at the bar, and is narrowed by the marshy lands inside to 50 yards abreast the town. Beyond this point the river traders go about 50 miles up the stream to bring down timber.

Pilots.

The pilots do not come from Návia, but from Ortiguera, where all the inhabitants are sailors and fishermen. The signal for a pilot is promptly answered, and one or more boats come out to tow, or render assistance should the vessel ground. Water may be obtained from the river at low tide.

Marks.

Lying between the lights of Tapia and Cape Busto, Návia inlet is easily recognized by either of these lights, or by the chapel on cape San Agustin. From seaward the best mark is mount Jarrio, 1,056 feet high, on the western shore, and 2 short miles SSW. $\frac{3}{4}$ W. from cape San Agustin.

Coast.

Point Campel, the eastern point of entrance to Návia inlet, is low at its extremity, but rises rapidly to a hill of the same name. Just E. of it is the low point of Hocico de fuera, projecting to the northward, and dangerous, on ac-

count of a sunken rock, with 2 fathoms water on it, lying 200 yards outside of it and breaking with the least sea. Small craft pass inside this rock in fair weather.

After the latter point, the coast remains high and regular, rising to hills and mountainous land at 2 and 3 miles inland.

Point Corbera, a short mile E. of Campel point, is low and broken, with a rock a short distance outside of it. Farther E. is the long, steep beach of Freijulfe, of dark sand scattered with rocks.

From this beach the coast continues eastward of rather low cliffs, with clean ground off it, to Vega islet, lying W. of the little port of the same name. This islet lies N. and S., forming a high, round head, and reefs extend a short distance from it all around. A little NE. of it there is a rock that dries at low water, and a dark, rocky islet, named Corberon, is on its western side and near the coast. Inside these rocks there is a boat-channel, used in fine weather.

The chapel of the Virgen de la Atalaya de Vega is $3\frac{1}{2}$ miles E. $\frac{1}{4}$ S. from the chapel of San Agustin, and they may be easily distinguished from one another, as the former is built E. and W., while the latter stands N. and S. It is on level land W. of the port of Vega, about 90 feet above the sea, and called the Atalaya, a name used to designate any elevation whence a considerable view may be obtained. The point terminating the Atalaya de Vega is named Barroco.

The mouth of the port of Vega is a little E. of the chapel. Port Vega.
The channel is extremely narrow and tortuous, leading between reefs to a little port, both port and reefs drying at low water. The port is so small that there is only one place large enough for vessels to turn, and only one spot scarcely large enough for a single vessel to lie afloat at low water; but it has the advantage of having no bar, and can be entered when Návia cannot, so that coasters bound for the latter place often enter port Vega to wait for a favorable time. Only vessels of 7 to 9 feet draught can enter.

The port is approached in $7\frac{1}{2}$ to 4 fathoms water by bringing the top of the roof of a square house in the eastern part of the port on with the middle of the parish church, which

is on a plain some little distance inland. When a vessel nears the entrance, boats put out to pilot her in.

The town, with about 500 inhabitants, is chiefly a fishing village. A portion of it can be seen from seaward, and this with the chapel, the parish church, and a ruined castle on the east point of entrance form good marks for the port.

Romanellas
rocks.

Camaxima or Romanellas point is about $1\frac{1}{5}$ miles E., nearly, from the chapel of the Atalaya. Two blackish rocky islets, with a boat channel between them, lie NNE. of the point; and a third, larger than the others, is nearer the coast. They are called the Romanellas, and may be passed at a short distance, as the ground is clean around them.

Coast.

A steep, broken shore follows the Romanellas rocks to Cuerno point, projecting, and of reddish crags, one of which forms a curve to the S. in the form of a horn. West of it there is a large fissure, where the Barrayo river falls into the sea, but it has a bar that hardly allows even the fishing-boats to enter at high water. Point Cuerno is clear and safe, and E. of it the coast forms a bight with a clean beach, off which the fishermen and coasters find shelter from SW. winds. A little farther E. is another beach, and then a high, steep coast follows to point Mugerres, low, rocky, and foul, the western limit of Luarca bay. From this point reefs set off, called the Sierras, and when the sea breaks on them it breaks also on the bar of the port. A berth of 1 or 2 cables should be given the point in fair weather, and more if there is much sea on.

Port Luarca.

Luarca bay is a small bay with 3 to 7 fathoms water, sandy bottom with patches of rock. It lies between Mugerres point on the W. and Blanca peninsula on the E.; the clean ground is small, and vessels anchoring to await a tide for entering the port or going out, should only do so in fine weather, and must come to near the middle of the bay, in 5 or 6 fathoms.

The port of Luarca opens at the head of the bay, and after passing the bar is little more than a tortuous, narrow channel, kept open by the flow of the Negro river. The town of Luarca is built in the form of an amphitheater, the principal part being on the eastern side of the port. High, rocky cliffs follow the circle of the port, the only breaks being one through which the river flows and a second at

the entrance. The center of the port is a bed of shingle that dries at low water, and the narrowness of the channel prevents any but small and short vessels from seeking it; none that draw more than 11 feet can cross the bar.

The channel follows the eastern shore along a circular mole or wharf on the Blanca peninsula, and the fishermen act as pilots. There are no regular pilot-charges. The port is unsafe in on-shore gales. Population of the town about 2,500. Water and provisions are plentiful, and repairs may be effected.

Near the extremity of Blanca peninsula there is a square, white light-tower with yellow angles and white lantern, the height of the building being 30 feet. From this there is displayed, at an elevation of 204 feet* above the sea, a *fixed white* light, visible 7 miles in clear weather.

Light: Lat. $43^{\circ} 34' 30''$ N.; Long. $6^{\circ} 32' 56''$ W.

The time of high water, full and change, at Luarca, is 3^h; springs rise ordinarily 12 feet, with an increase of 2 or 3 feet with strong NW. or SW. winds.

Tides.

La Moura rock, which hardly uncovers at low water, is 100 yards N. by W. from Blanca peninsula, and all large vessels should pass outside of it; for, though there are 4 and 5 fathoms in the channel between it and the peninsula, there is a ledge in mid-channel with only 11 feet of water on it.

Dangers.

Fierro rock is about 50 yards NW. by N. from the peninsula, and Minas rocks about 70 yards NE. $\frac{1}{2}$ E. from it.*

The position of Luarca is easily recognized. The best marks are Busto light-house, $3\frac{1}{2}$ miles ENE. nearly, Blanca light-house, and the chapel of Nuestra Señora de la Blanca, a little S. of the light-house, with a high belfry that can be made out from a considerable distance. On nearing the port the houses of the town are seen, and the bed of reddish shingle that appears to obstruct the entire port.

Directions.

It has been stated that vessels coming from the E. should pass outside of Moura rock. In coming from the W., a berth of 1 or 2 cables should be given Mugerres point in fair weather, and more if there is any sea, as there are heavy breakers over the reefs and foul ground. A good berth,

* B. A. Chart No. 726 and the English sailing-directions give the elevation of this light as 177 feet.

too, should be given the beaches of Salinas and Fuente de Abajo.

Coast.

On the eastern side of Blanca peninsula there is a small bay, named Reas, that almost makes the peninsula an island. There is a beach at its head, but all the ground is foul. A short stretch of broken coast follows, a small bight in it being named Portezuelo, and another farther on, extending E. and then S., is the mouth of the river Esba or Caneiro, the bar of which dries at low water. Inside the bar is the little port of Cueva, visited annually by a very few coasters to embark the timber brought down the river. The bar only carries about 9 feet water at high springs, and there is a rock near the middle of it that narrows the channel.

Cape Busto.

Thence the coast—high, steep, and of a reddish color—runs northward to cape Busto, that takes its name from the village on its summit, which is broad and level. A reef extends for about 100 yards WNW. from the cape, and shows near its extremity the Moura rock that uncovers at low water. A conical islet, of moderate height, named Serron, and locally known as Salto islet, lies ENE. of the cape, and is connected with it by a reef that dries at low tide. A few detached rocks lie close to the islet and cape, but being bold they may be passed at a short distance. The cape may be known by its level appearance, its cliffs, and the light-house on its summit.

Light: Lat. $43^{\circ} 35' 55''$ N.; long. $6^{\circ} 28' 48''$ W.

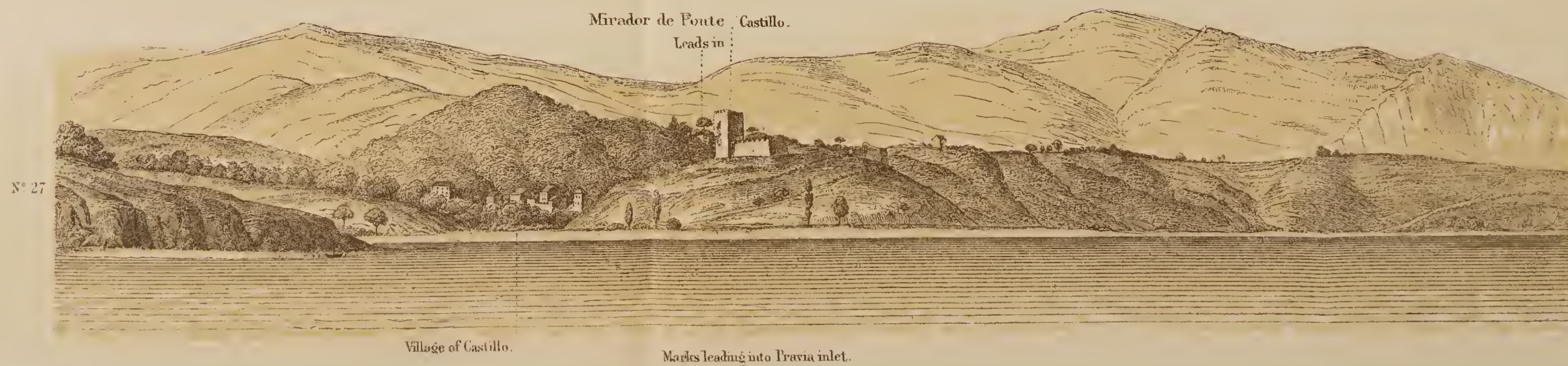
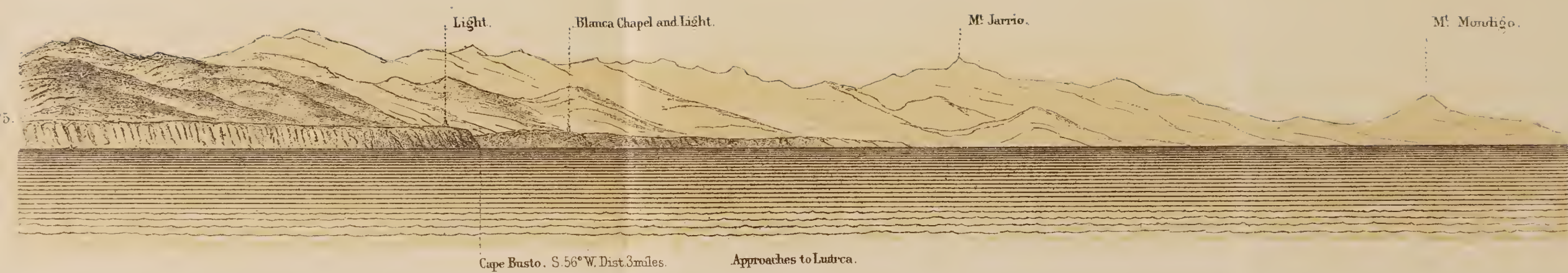
From a white rectangular tower 34 feet high, attached to the keeper's dwelling, and at an elevation of 307 feet above the sea, there is displayed a *fixed white* light, varied by a *red flash every two minutes*, and is visible 12 miles in clear weather.

Serron bank.

A rocky bank known as the Serron, and with 23 to 27 fathoms water on it, lies 4 or 5 miles NE. of cape Busto. There are 55 fathoms N. of the bank and 45 fathoms S. of it. It is only dangerous in heavy weather, when the seas have been seen to break on it. The marks for this bank are Rabion de Artedo islet, open of cape Bidio, and the Luares—two black rocks close together and near the coast—in one with a dark vertical fissure in the cliffs, named Fuente de las Melendreras, from the brook of that name that flows through it. The rocks and fissure in one bear S.

Peton bank.

Another small rocky bank, named the Peton, lies $2\frac{1}{2}$ miles



N. of cape Busto, and has 27 to 36 fathoms water over it, and 55 fathoms at a short distance all around. It is only dangerous in very heavy seas.

From cape Busto the coast runs eastward, about 10 miles Coast. to cape Bidio. In this extent there are some little bights and beaches where the fishermen land occasionally in good weather. It is generally clean and safe of approach, as the rocks that front it are close to the shore. The most prominent and the farthest out of these rocks are the Negras, so called from their dark color. They are low and rugged, lie 300 or 400 yards off shore, and are the most prominent of a reef $1\frac{1}{2}$ miles SW. of cape Bidio. There is a boat-channel between them and the shore.

The Agudas de Cadavedo are rather high, pointed islets, lying close to the shore, just W. of a small bight of the same name; and the Cruces are low, black, broken rocks, lying near the shore, about 3 miles E. of cape Busto. All the rocks formed originally a portion of the cliffs that are gradually broken by the constant action of the sea.

The most important bight is the little bay of Cadavedo, where fishing-craft find shelter from SW. winds. All this coast ranges from 230 to 280 feet high, the land rising at 2 or 3 miles inland to the mountain ranges.

Cape Bidio, or Vidio, is of generally the same character as Cape Bidio. cape Busto, and of nearly the same height. A high conical islet, named Chouzano, lies 30 or 40 yards N. of the cape, with a boat-channel between; it is of whitish, laminated rocks, like those of the cape. At 100 yards outside the islet is a sunken rock, named Chouzanin, or Lozanin, the channel between being only used by the fishing-boats. All the coast between capes Busto and Bidio may be passed at the distance of 1 mile, under favorable circumstances, in 20 to 30 fathoms, rocky bottom.

East of cape Bidio the coast forms the bays of San Pedro San Pedro and and Oteiro, or Oleiro, separated by a high, sharp headland, Oteiro bays. off which are rocks and detached dangers. San Pedro, the westernmost, is the more spacious, and has a clean beach. The beach of Oteiro is limited on the E. by a high, steep islet, named Rabion de Artedo, connected with the mainland by a short ridge of bare rocks, while another chain of ledges and rocks extends NE. from it, the two giving con-

siderable protection to Artedo bay from a NW. sea. The extreme point of the rocks is called Rabion point.

Artedo bay.

A short distance SSE. of Rabion point is point Austera, the NW. point of entrance to Artedo bay. This bay, a short mile across, and half a mile deep, has a clean and accessible beach, and is limited on the SE. by the foot of the mountain of Santa Ana, or Montares. There is good anchorage for all classes of vessels in 8 to 10 fathoms water, sand, sheltered from SW. winds, and partially from those of the NW. quarter. A good berth for a large vessel is in 10 fathoms off a white mark on the cliffs of the W. shore, about 150 yards from the shore, and with the hermitage of Santa Ana bearing S. $\frac{1}{2}$ E. This roadstead is only used in summer, as in winter it is exposed to the sea rolling in from the NW. as well as to the NE. gales. To enter with any sea from the NW., a berth of at least 1 mile should be given Rabion point, as there the sea runs high, and even half across the mouth of the bay. There are 14 fathoms water, sand, at the entrance. The position of the bay is easily recognized by Rabion islet and by mount Santa Ana, which is S. of the bay, and may be known by its hermitage, white, and standing out boldly on the eastern slope.

Port Cudillero.

The little port of Cudillero is $1\frac{1}{2}$ miles E. of Artedo bay. It is only a cove formed by a break in the cliffs of the coast, and protected on the W. by a chain of dark islets, named the Colinas, extending a considerable distance N. The entrance, between reefs, is narrow and shoal; a mole running E. and W., with a narrow entrance close to the rocks, is the only shelter, and is insufficient with a heavy sea; it dries at low water, and at the approach of bad weather the boats are hauled up near the houses of the village. The town contains about 2,000 inhabitants, chiefly fishermen. The boats are excellent, and the fishermen frequently go 30 to 35 miles out to fish in 300 to 400 fathoms. The port will only admit small craft.

Light: Lat. $43^{\circ} 36' 10''$ N.; long. $6^{\circ} 09' 03''$ W.

There is a light-house on Revallera point, the eastern point of entrance to port Cudillero. The tower, which is white with a green lantern, rises from the white, rectangular, keeper's dwelling, and displays, at an elevation of 98 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

From Cudillero the coast trends to the southward of E., steep, regular, and clear, with a few short stretches of foul beach, the bottom a little distance out, being generally of fine sand. Most of the detached rocks lie close to the shore, but a sunken rock named Señorío lies a little more than 300 yards N. of Furada point; it has only 4 feet water over it at low tide, and $3\frac{1}{2}$ to 4 fathoms between it and the shore, with deeper water outside. To pass clear outside keep Erbosa islet open N. of Deva islet, and to pass inside keep the light of cape Peñas open S. of Deva islet. Coast.

A little more than 3 miles E., nearly, from Cudillero light, and $8\frac{1}{2}$ miles ESE. $\frac{3}{4}$ E. from cape Bidio, is the hermitage of Espiritu Santo, about 190 feet above the sea and 50 yards from the extremity of the point of the same name.

Point Espiritu Santo is the western point of entrance to the Právia river or inlet, into which the Nalon river empties. This beautiful estuary, formerly of great importance from the large exports of timber brought down the Nalon, and the linen manufactures of Trúbia, is less frequented in the present day, as the port of Gijon has taken much of its trade. It is an excellent and accessible harbor for vessels of 15 feet draught, with the advantage of their always lying afloat at low tide in the well-sheltered port of San Estéban, on the western shore, about three-fourths of a mile within the bar. Právia river.

The bar is broad and short, and has a minimum depth of 7 feet water over it at low springs, and 18 or 19 feet at high water. The only obstacle on it is Lamparon rock, about the size of a launch, that uncovers at low springs, and might be easily removed. This leaves a western channel 35 yards wide, and an eastern channel 80 yards wide between it and the edge of the banks that front the eastern shore; the latter is the one generally used. The bar is partially protected from the sea by chains of reefs and rocks extending N. and NNW. from Espiritu Santo point. The outermost of these are two, named Lladrona, about 125 yards north from the point; inshore of them there is a boat channel. The bar, which is of sand, constantly shifts, but always keeps over on the western side toward the point and rocks; there is a slight increase of depth after a heavy freshet, and a decrease after on-shore gales, but the depths given above may usually be depended upon. Bar.

Port San Estéban.

After crossing the bar a depth of 9 to 28 feet is found in the channel 25 to 35 yards from the western shore until port San Estéban de Právia is reached. Here the coast forms a bight, where the vessels are secured four abreast in 20 to 30 feet water, good holding-ground, and well protected from SW. and NW. winds by the high sierra of Espiritu Santo. There is room for a great many vessels, and here the largest of them take their cargoes. The village of San Estéban is on the hill-side, and numbers about 230 inhabitants. In winter the shore-forts are re-enforced on account of the freshets.

Forno anchorage.

About 800 yards SE. by S. from San Estéban is the Castillo, a ruined castle, with an oblong, turreted tower, on the summit of a hill, S. of which are the villages of Castillo and Soto del Barco. Here the river turns to the W. for nearly a mile, forming in this distance another navigable bight, called Forno, where the anchorage is good and sheltered, as at San Estéban. Many vessels come here to load with timber, but those of much draught cannot complete their cargo, as in going down the river it is necessary to pass over banks with only 3 or 4 feet water on them at low tide. At this anchorage there are docks for the deposit of the timber, and on the southern shore, between Forno and Castillo, are the government docks, where some of the timber has been seasoning for years. There is little navigation of the Nalon above Forno, even for the smallest craft.

Resources.

Water may be obtained at the port of San Estéban from a fountain close to the shore and near the ruins of the mole. Provisions are scarce in the village, but may be obtained in any quantity from Múros, $1\frac{1}{2}$ miles distant, where the marine superintendent of the district resides.

Tides.

It is high water, full and change, on the bar of Právia at 3^h, and at San Estéban at 3^h 15^m; springs rise 12 to 13 feet, and neaps about 10 feet; but it is difficult to fix the exact rise, as there is an increase of 3 or 4 feet with NW. and SW. winds, and a similar decrease with winds from NE. and SE.; thus, with the former there are frequently 22 feet on the bar, and with the latter hardly 14 feet. The average velocity of the current over the bar is 4 knots, increasing to 5 knots on the ebb during freshets.

The bar is only closed by very heavy seas, as the reefs of Lladrona, Percebosa, and Emballo protect it to some extent; when the sea breaks on the latter it breaks also on the bar. The bar should only be taken with winds from ESE., through N. to NW., or WNW., by a sailing-vessel. With the latter winds it must be crossed on the flood, for the wind becomes scant and squally as the entrance is approached; and on the ebb with these winds a vessel would run the risk of being set on to Lamparon rock.

With fresh on-shore winds the bar may be crossed on the ebb, but with light ones it is well to wait for high or slack water.

The eastern channel has remained substantially unchanged for some years; the mark clearing Lamparon rock and leading through, is the Castillo tower on with a square house with a balcony, that stands in a grove on a hill-side, 400 yards S. 4° E. from the Castillo; this house is known as the Mirador de Ponte, and is rather difficult to make out on account of its small size and dark color, but the bearing given above assists to identify it.

Vessels of large draught should take a pilot, both for entering and leaving. The pilots are the fishermen residing at San Juan de la Arena, a village on the sands of the eastern shore, and they go out directly a vessel is seen approaching. Pilot charges 50 reals in summer and 60 in winter, either entering or leaving; there is an additional charge of 40 reals if the vessel is bound to Forno. Boats that lend assistance are paid 70 reals for the first, and 60 for any more that may be needed. The fishing-boats are not of much use in towing, as they pull but few oars.

East of the bar of Právia is a clean, half-mile beach named Quebrantes; this is followed by a short line of cliffs, close off which some dark rocks, called the Cuervos, always show. Another long beach, named Bayes, from the village of that name near it, follows, and terminates near point Cogollo. There are a few scattered rocks off the beach. Cogollo point projects to the NW., and forms, with Espiritu Santo point, the large bight containing the above beaches. A few rocks lie off the point to the E., but they are bold enough to allow coasters to pass at a short distance.

About 200 yards N. by E. $\frac{1}{2}$ E. from Cogollo point is

Directions.

Cogollo point.

Deva islet.

Deva islet, high, rugged, and surrounded by rocks, the largest of which lies close off the NE. part of the islet, and is named Altarin; other rocks, named the Borriones, lie W. of Deva islet, and are covered at high water. There is an inshore channel for coasters, but it is only used by those locally familiar on account of the rocks it is necessary to avoid in its eastern part. Deva islet is a good mark for Právia inlet.

Coast.

A high, steep coast, with occasional short and foul beaches, trends ENE. to point Vidrias or Rayo; this point is also high and steep, with a rocky islet, named Moro, that covers at high water, off its foot. A reef of rocks named Anuales extends 1 mile NNE. from the point; channels are left between the rocks, and there are 7 fathoms water over the extremity of the reef, and 16 to 22 fathoms around it; several heads show at low water. The water breaks on the reef if there is much sea on.

East of Vidrias point the coast bends to the southward to form the bay of Correal, with a beach at its head, and a little farther eastward is the bay of Santa María del Mar, so called from the village of the same name on the heights of the coast. Ladrona islet, high and rocky, is on the W. side of the E. point of entrance to Santa María del Mar bay.

East of Vidrias point the coast is as high as before and rather more broken. The most considerable of the beaches is that of Arnao, where small craft go to load with coal from the mines of Arnao. The town of this name is on a height near the sea, and the houses and chimneys of the factories of Arnao can be seen in sailing along the coast, and a little E. of them those of the zinc-works near the shore. A railway now connects the mines with Avilés.

Requexo point, a low, rocky point, the termination of a high headland, is next to the eastward; and is the western extremity of the extensive sandy plain of Espartal or Raices, which, from its height and whiteness, can be seen a considerable distance. This plain forms the western limit of the bar of Avilés, and its sands are so fine and shifting that they are easily blown about by the winds and alter the configuration of the plain.

Avilés inlet.

The entrance to Avilés inlet and the bar are at the termination of the plain. The inlet runs in for 4 or 5 miles to

28.

Cape Penas

Deva Islet

Erbosa F. N. 71° E. Dist. 15 miles

Pravia Inlet

29.

Avilés Castle. (Lt Ho. not shown in sketch)

Forcado Point

Entrance to Avilés Inlet

30.

Atalaya

Lauanco

Lauanco Bay

Vaca N. 49° W. Dist. 3½ miles

the south, but the bar and entrance are E. and W., so they may be taken with NW. winds, the cross-winds of the coast; when these are strong enough to raise much sea, however, the bar is closed, and a vessel caught in this bight of the coast is in a very dangerous position, as it is difficult to work to windward. As the bar is narrow, it may be attempted in such a case when the tide serves, running the risk of being struck by the sea.

Avilés inlet is so obstructed by shifting sands that only vessels of about 7 feet draught can be taken to Avilés, 3 miles within the bar, and the channel should first be buoyed, for there are many blind channels, and the only open one is very variable. At low water the banks uncover beyond San Juan, and near Avilés the river may be crossed dry-footed. The deepest water is near San Juan, a collection of houses on the eastern shore three-fourths of a mile within the bar; here there is a hole, with 9 feet at low water, where small vessels may lie afloat. Vessels lie aground alongside the mole at Avilés on a mud bottom; but in taking the ground in any other part of the river, take care that the vessel's head is placed to the stream. There is a project to make a canal to the town.

The bar extends from the northern extremity of the plain of Espartal to the point on which stands the castle of Avilés. Vessels waiting for a tide to enter anchor at the Bogariza anchorage off the cliffs between Castillo and Forcada points, in 7 to 9 fathoms water, sand, and sheltered from winds from NE. to SE. through E. This position is about 200 yards from the coast and off a deep break in the cliffs, called Covallonga. This anchorage should only be taken in moderate weather, and to await one tide.

It is high water, full and change, on the bar of Avilés at 3^h, and at the town one hour later; ordinary springs rise 12 feet, with an increase of about 2 feet with NW. and SW. winds, and a corresponding decrease with NE. and SE. winds. The river is not subject to freshets, and the stream never runs more than 4 miles an hour. Opposite the town the ebb runs 8½ and the flood 4 hours.

On Castillo point, the N. point of entrance to Avilés inlet, there is a light-yellow octagonal tower with green lantern, attached to the keeper's dwelling, where there is dis-

Bar.

Tides.

Light: Lat. 43° 38' 05" N.; long. 5° 56' 26" W.

played, at an elevation of 130 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

Avilés.

Avilés, on the western shore of the inlet, 3 miles within the bar, has tolerably regular, well-lighted, paved, and drained streets; several squares; an elegant guildhall built on 13 arches, and having a quadrangular tower; several churches, a hospital, and other public buildings; with numerous public and private fountains. The manufactures are copper vessels, lime, earthen ware, glass, linen, damask, cambric, and drills; and bleaching is carried on. The commerce consists chiefly in the export of copper vessels, earthen ware, and a considerable quantity of coals. Population about 5,000.

Resources.

Provisions and water may be obtained in abundance from the town, where there are also good facilities for repairs. The terminus of the railway from the Arnao mines is at a mole opposite the village of San Juan.

Directions.

The port of Avilés, open to winds from SW. to NW., is available for vessels drawing 12 feet water, at either spring or neap tides. Vessels can enter under steam or with fair wind (from SW. to NW.) under sail.

Steam-vessels can put into Avilés, even at ebb-tide, if the sea is smooth. The current from the cliffs on the southern shore runs across with considerable strength to point Gayo, as far as the bar. Having crossed it, keep close to the land on the northern side, and head for the Royal Company's wharf or the anchorage of San Juan.

If obliged to put in on account of bad weather, let go the starboard anchor when a little to the eastward of the Royal Company's wharf. The bottom is fine sand, and the position one at which the vessel can ride easily. If the vessel is to keep on to Avilés, keep on along the heights for about 3 miles to reach the public wharves.

At springs, vessels drawing 15 feet can reach the San Juan anchorage, and those drawing 12 feet can reach the public wharves.

The inlet is about the middle of the bight, 20 miles across, between Deva islet and cape Peñas, and called Avilés bay. This bay is dangerous in NW. gales, as the sea then breaks heavily over the foul ground. In case of being embayed, however, the only resource is to take the bar, which is, for-

tunately, short, and to run the risk of being struck by the sea.

The Anuales reef, setting out from Vidrias point, is one of the most dangerous, but as it breaks with little sea it is well marked in position. An equally dangerous shoal, named the Peton, a rocky head with 5 fathoms water on it, is ENE. of the latter and breaks when there is much sea; from the rock the chapel of Espíritu Santo, in Právia inlet, is on with the inshore slope of Deva islet, and the store-house of San Juan (a white house farthest S. in Avilés inlet) is a little open of Avilés Castle point; a vessel approaching from the westward should therefore keep the store-house on with the point until the line of the Deva on with the chapel is passed. Dangers.

Aguin bank, with 8 to 9 fathoms water, extends some distance westward from Forcada point, inclining toward the above rocks, so that all these are but the summits of a rocky bed having unequal depths of 15 to 20 fathoms.

There is an almost constant NE. current in Avilés bay, caused by the waters from Právia inlet setting ENE. along the coast, and the opposing westerly current off cape Peñas. Currents.

The current over the bar leaves the deepest water close to the point of the castle, and it is necessary to approach the point almost to the rocks. The only danger after crossing is the Arañon rock, marked by a buoy, one-fourth of a mile within the entrance.

The boatmen of the port act as pilots, and go out when a vessel is seen in the offing. Pilot-charges for vessels of 50 to 150 tons are 40 reals in summer and 50 in winter; for larger vessels 50 and 60 reals. Pilots.

The round tower of the castle is an excellent mark for the entrance, and cannot be mistaken for any other object along this part of the coast.

Point Forcada, bold, rocky, and projecting to the NW., is $1\frac{1}{2}$ cables NW. $\frac{1}{2}$ W. from Avilés castle, and between them is the remarkable break or cove named Covallonga, before mentioned. It is about 100 yards deep, and 12 or 13 yards across, with vertical walls of cliffs, the only accessible landing being at its head. It is open to the SW., and might be used in landing the crew of a vessel necessarily abandoned Coast.

in the bay. Beyond Forcada point the coast trends E. and N. to Home point, forming Chaon bay, bounded by an extensive beach interspered with rocks. Thence a rocky and sinuous coast runs northward to cape Negro or Cornorio, a little more than 2 miles NE. $\frac{3}{4}$ N. from Forcada point. The cape is high, steep, and, like cape Peñas, at its foot there are a few rocks that dry at low water and a shoal of small extent, but it may be passed safely at a distance of half a mile.

From cape Negro a steep coast trends eastward to Llampero point, forming a bight. The point is low and rocky, with an islet and some rocks at its foot, and the coast is bold and steep-to. Beyond Llampero point is a port of the same name, protected in some degree from the sea by the point and some reefs. The fishing-boats of Luanco and Candás lie here sheltered from the NW. winds, and those of Avilés take this anchorage when they cannot cross the bar. There is a small shingle beach at the head of the port, where the boats haul up.

Eastward of port Llampero and 100 yards off the termination of a long beach is Bermea islet, rocky, of moderate height, and reddish color. There is a clear channel of 7 fathoms water between it and the shore. Berdicio beach, which commences abreast the islet, extends eastward and northward to Arcas or Ratin point, low, craggy, and inaccessible. The bay thus formed is clean and navigable by the lead, and coasters use it as an anchorage in winds from NE. to SE. The usual anchorage is in 14 fathoms water, fine sand, with Gavierra islet off cape Peñas showing through the Erbosa channel, whence vessels can make sail and clear the points. The bay is dangerous in NW. winds. Beyond point Arcas is another small bight, having a little shingle beach in it; the rest of it is foul. The northern limit of this bight is a pinnacle rock named Agudo de Sabin or Peñas, lying just off the western part of cape Peñas, whence it may be visited on foot; on its NW. side there is a large, deep cave, which from a distance looks like a chapel, and is called by the fishermen the Capilla or Canalon del Sabin.

Cape Peñas.

The north face of the promontory of cape Peñas extends 1 mile E. by N. from the Agudo de Peñas; it is 340 feet high, and presents three rugged, precipitous points. This

formidable stretch of coast is called Pedregal by the natives, and the name of cape Peñas is given to the easternmost point, off which is Gaviara islet, with a boat-channel inside it.

A white, circular light-tower 33 feet high, with a keeper's dwelling on its northern side, stands on the first plane surface of cape Peñas, a short distance from the edge of the cliffs; from this tower there is displayed, at an elevation of 340 feet above the sea, a *white light, revolving every half-minute*, and visible 21 miles in clear weather.

Light: Lat. $43^{\circ} 42' 20''$ N.; long. $5^{\circ} 49' 43''$ W.

At 150 yards N. 5° W. from the Agudo de Peñas, is Erbosa isle, rocky, of moderate height, steep to the NW., sloping rapidly to the SW., and one of the chief of the many islets and rocks surrounding the cape; the summit of the island is covered with vegetation, and on its SW. side there is a natural cavern or arch, called Ventana de la Erbosa, through which boats pass in fair weather. The channel inshore of the island is 7 fathoms deep, but full of rocks, between which coasters, locally familiar, thread their way; this passage can only be attempted in the best weather, as with any sea the channel breaks all across.

Erbosa isle.

A conical rocky inlet, named the Bravo, lies 50 yards NNE. $\frac{1}{2}$ E. from Erbosa, and a similar one, named the Monista, a short distance NNW. of the same island. To the west are numerous minor rocks, five of which, the Corberas, always show. There are also three sunken rocks, named the Conos, the most dangerous of which, Noroeste, (the northwester,) lies about half a mile NW. of the Bravo, and has less than 4 fathoms on it at low water, but in fine weather its position is shown by the ripple over it, and in bad weather by the breakers. The other two lie within a little more than 50 yards NE. of the Bravo. In the channel between the Noroeste and the Bravo there are 20 fathoms water, and between the Bravo and the others, 8 or 9 fathoms. Between the Bravo and Erbosa is another rock, named the Molino, that shows at low water.

Several sharp, rocky heads extend in a NE. $\frac{1}{2}$ N. direction from cape Peñas. A chain of reefs, named the Merendálvarez, with but little water over them at high tide, extends northward from Gaviara islet in line with the cape, and terminates in a rocky head, named Romanella, that bears N.

Merendálvarez reefs.

81° E. from the center of Erbosa isle. The Romanella uncovers at low water, and between it and the reefs there is a narrow channel used occasionally by coasters, and between the reefs there are boat-channels. The Romanella is dangerous at night in fair weather, but it shows when there is any sea.

Somosllungo
bank.

Somosllungo bank is $3\frac{1}{4}$ miles from Gaviera islet, and bears NE. by E. from the light-tower on the cape; it is the summit of a submarine peak, and is covered with 13 to 16 fathoms water, the lead falling almost immediately to 30, 40, and 45 fathoms in a direction principally NE., on which side the bank appears to be nearly vertical; toward the land the bottom seems to be more inclined, there being 30 fathoms near the bank, 23 fathoms about in mid-channel, and 16 fathoms near the Merendálvarez. The sea breaks very heavily on it in bad weather, and at such a time it should be given a wide berth: the sea is generally heavier off Cape Peñas than off the rest of the coast. From the least water on the bank the Agudo del Peñas is on with Deva islet, and the western peak of mount Peral, or Ventoso, is on with the field of Narvata. This hill, about 5 miles SSW. of Avilés, is known by its three peaks, the westernmost being the highest, and the one farthest east the lowest and most pointed. The field of Narvata is a plain, terminating in a cliff that forms the southern limit to Llumeres bay, and a ruined castle is seen on it.

Winds.

Contrary winds are frequently found in the vicinity of cape Peñas; a vessel will sometimes make the cape with a strong NE. or E. wind, and find the contrary near the land, and so when approaching with a W. or SW. wind. In summer the prevailing winds are from NE. to SE., occasionally interrupted by westerly winds accompanied with rain; but in winter southwesterly winds are almost constant; these bring foul weather, blowing strong for three or four days, with rain, until the wind shifts in a heavy squall to NW., and the weather clears. Both these winter winds are to be dreaded, as the SW. makes havoc among the coasters, and the NW. blows extremely strong, rolls in a very heavy sea, and closes all the ports.

The northers, called *travesías*, rarely last more than three days, and blow only between December and March; a vessel

caught in one of them on this part of the coast had better stand to the eastward, as the coast trends somewhat to the S., and the wind usually ends at NE.

The general direction of the current past the cape, and especially in winter, is to the eastward. In summer it sometimes has a westerly set, particularly after several days of NE. wind. The tidal current sets to SE. with the flood, and to SW. with the ebb. Currents.

Cape Peñas is one of the most salient points of the northern coast, and is an excellent mark for the ports of Avilés, Luanco, and Gijon; it is easily known by its peculiar appearance during the day, and by its light at night; for, besides being very projecting, its surface is level to the foot of the high land that continues along the whole coast of Asturiás, at 3 or 4 miles from the shore. In structure it is like capes Busto and Eidio, and of the same color, for its cliffs show the whitish color of the quartz of which they are partially composed. Seen from the W., the perfect level of the surface is only broken by a few groves of trees and scattered buildings; and from the E. the view is much the same. Directions.

In heavy weather large vessels should pass outside the Somoslungo, at 5 or 6 miles from the cape. Vessels bound to Gijon from the westward, with southwesterly winds, should pass inside the Somoslungo, and may borrow toward the Romanella, passing a mile outside the Gavieria and Bravo, in 30 to 40 fathoms water. To clear the Conos coming from the W., keep the Merendálvarez rocks on with the Vaca de Luanco; and, coming from the E., keep well northward until Erbosa is open of the Gavieria, and then continue westward.

CHAPTER III.

FROM CAPE PEÑAS TO CAPE MAYOR.

Variation in 1876.—Gijon, $19^{\circ} 35'$ westerly; S. Vicente de la Barquera, $19^{\circ} 05'$ westerly.

Llumeres bay.

From cape Peñas a steep coast trends southward and eastward, forming a bight that terminates at a high, round islet, named Castro, lying 10 or 12 yards from the shore; a short reef extending NE. from the islet is called Castro point. To the E. of the islet is the spacious bay of Llumeres, extending in to SSW., and ending in a clean beach of coarse, dark sand; the SE. limit of the bay is Narvata point, steep and of moderate height, with a rocky reef at its foot; the field of Narvata terminates here, and on the brow of the point are the ruins of the castle of the same name. The southern shore of the bay is steep and bold, but the northern is fronted by rocks extending some distance to NE. As the bay is clear and navigable, and is sheltered by cape Peñas from the swell from NW., it is a good port of refuge during SW. winds, and in case of necessity lives may be saved by running the boats into the smooth water between Castro rock and the beach. Coasters frequent it to load with the iron-ore that falls from the cliffs, and anchor near the shore in 7 to 9 fathoms water, sand. As the bay is open to NE., it is unsafe in these winds. A small stream winds through the valleys W. of the bay and empties at the beach. The nearest town is Bido, on the plain of cape Peñas.

Coast.

From Narvata point the coast, steep and fronted by rocks, trends eastward to Sabugo point, a little more than 2 miles SE. by E. $\frac{1}{4}$ E. from Cape Peñas; a reef sets out from the low, rocky foot of the point, and terminates in Corbiro or Cordero rock which always shows, and inside which boats pass in fine weather; a short reef extends eastward from the rock. At half a mile ESE. of Sabugo point is

point Aguillon, and between them the coast runs in more than 1 mile to the S., forming Bañugues bay, through the beach at the head of which the stream of the same name empties; all the bay is obstructed by rocks, and it is only frequented by a few fishing-boats. Point Aguillon is smooth and projects to the eastward; Aguillon bank is a short distance off the point. From this point the coast is high and steep for a mile, to the Vaca de Luanco. A rugged intermediate point, named Moniello, projects to NE., and with Vaca point forms Moniello bay, 5 cables across, with a stream emptying at its head. The Vaca is a high promontory with cliffs of black, rugged, foliaceous rocks of very grim appearance; a few detached rocks lie close off it. North of the Vaca, and about 50 yards distant, is Chato rock, covered at high water, steep-to, and with a channel for vessels inside it. The rock is some 20 yards long E. and W.

From Vaca point the coast turns to the southward and westward for more than 1 mile to the town of Luanco; in this extent are seen the ruins of the lookout tower of Luanco on a cliff, and the ruins of a castle on Castillo point; between the two is another, rather high, point, named Caballo, with some rocks off it, the largest being Caballo rock. Off Castillo point there are other rocks, the largest and farthest off shore of which is Peon rock, and from it a reef extends still farther out, named Sierra del Peon. Espera cove is SW. of Castillo point, and has depths of 2 and 3 fathoms water, sand; small craft lie here to await an opportunity of crossing the bar. Luanco point, nearly three-fourths of a mile S. of Castillo point, is the SE. limit of Luanco bay, is rocky, and has rocks lying off it, the largest being Peña Cercada, an islet on whose summit is the hermitage of Nuestra Señora del Carmen.

Bay of Luanco.

At the head of Luanco bay are the town and port of the same name, the latter being formed by a small mole that curves to the SW., sheltering a basin only large enough to accommodate four vessels of 100 tons and a few small craft; it dries at low water, but vessels are not injured by grounding, as the bottom is of soft, muddy sand. When there is a heavy NW. sea on, a swell enters the basin at high water and the moorings must be carefully attended to. The town

Port Luanco.

has a population of about 1,750. The principal exports are grain, timber, and salt provisions. Good water is obtained from a fountain N. of the church, and provisions are plentiful.

Bar.

The bar is wide with depths of 19 to 22 feet over a rocky bottom, and may be taken always, except when there is a heavy sea. The obstructions are the Juan de Malao, Espiga, Peollo, and other rocks, and a pilot should be taken in entering. There is a channel on either side of the Juan de Malao rock, vessels usually passing S. of it. There are no regular pilots, but the boatmen act as such, and go out whenever a vessel is seen in the offing.

Directions.

To cross the bar, bring the point of the mole on with the middle of the narrow street that passes the N. end of the palace—a conspicuous building facing E.—and steer on this bearing till the bar is crossed, when the parish in the eastern part of the town will be on with the middle of Peroño Hill, NW. of the town. Beyond this alignment the vessel is in the Pozo de la Peña de Arriba, and may anchor in 2 to 3 fathoms at low water, sandy bottom, clear of the breakers of the bar.

Tides.

It is high water, full and change, at Luanco at 3^h; springs rise 13 feet and neaps 10 feet, a little more or less according to the direction of the wind.

Coast.

Eastward of Luanco point is point Cabritò, low and fronted by rocks, the most dangerous being Cabrito rock, which covers at high water, and inside which there is a boat-channel; it is about 20 yards from the point.

Point Cuerno de Candás is less than 1 mile from Cabrito point, and between them is the small bay and beach of San Pedro, where the fishermen take shelter from winds from W. to NNE. through N. The hermitage of San Pedro is on the hill beyond the beach. Sombrado point, low, rocky, and salient, is at the northern limit of the bay, and about 40 yards off it is the islet of La Isla, surrounded by rocks; small craft pass inside it in fine weather, but in heavy weather the whole channel breaks. Point Cuerno de Candás is high, steep, rocky, and projecting to NE., and on its sea-face are the ruins of Cuerno battery and a guard-house. A little S. of this point is point San Antonio, high, steep, and of triangular form, with a hermitage of the same name

on its summit; between them there is a small bight with reddish cliffs and full of rocks.

Point San Sebastian is about 200 yards S. by W. from point San Antonio, which it resembles, though it is somewhat higher, and between them is a cove receding to the westward, at the head of which a rivulet empties; the town of Candás is on one of the heights, and a small semi-circular, pebbly beach, surrounded by two curved moles, each about 120 yards long, and with an opening 65 feet wide, facing SE. from the port, capable of accommodating 30 or 40 fishing-boats at high water; it dries at low water, and it is difficult of approach in heavy weather, as it is beset by rocks leaving channels that can only be taken by those locally familiar. About 1 mile SSE. $\frac{1}{2}$ E., nearly, from point San Antonio is Peran point, low, rocky, and projecting to NE.; it derives its name from a small stream that empties just S. of it. Between these points the coast forms the bay of Candás, receding somewhat to the W., and dangerous of approach on account of the following dangers outside:

The Covanin, a rocky head of small extent, lies a short half-mile N. 58° E. from point San Antonio, and has 6 feet water on it, and 6 to 9 fathoms around it at low tide. The Sierra de Santa Olalla, rather larger than the Covanin, is $1\frac{1}{2}$ miles E. of San Antonio point, with $2\frac{1}{4}$ fathoms over it, and 7 to 8 fathoms around and inshore of it to the coast; it breaks heavily with much sea. The Castañar shoal is the most dangerous of all, as it is farthest off shore and on account of its heavy breakers; it is E. of point San Antonio, and lies 2 miles off shore, and it has $2\frac{1}{4}$ fathoms water on it; it is not so large as the preceding, but is more steep-to. Another shoal, named Sierra, lies about 1 mile S. 60° E. from San Antonio point, and 200 yards from Socampos point, and has 2 fathoms water over it; it is of small extent, and between it and the shore there are 7 to $3\frac{1}{2}$ fathoms water, sand and rock. The Peton de Entrellusa is a rock farther E. than the latter, and with more water over it, and only breaks when there is a heavy sea on. All these dangers are portions of a rocky ledge fronting the coast, commencing at cape Peñas and ending in the Cerro de Santa Catalina de Gijon; there are patches of sand between them,

over a rocky bottom that extends a considerable distance off shore. In passing along this extent of coast vessels should keep $2\frac{1}{2}$ to 3 miles out if there is much sea on, as the breakers extend well out and the sea is heaviest near the coast. Between capes Peñas and Torres there is good shelter from SW. winds, and vessels bound for Gijon, nearing it at night, can keep under sail between the capes, only taking care not to draw too close inshore.

Coast.

From Peran point the coast runs eastward to Socampo point, low and rocky, and thence to Aviado and Entrellusa points, of similar character and surrounded by rocks. A steep coast with occasional patches of foul beach continues, in a SE. direction, to the mouth of the Aboño River, which empties at the foot of a hillock of considerable height, through a steep beach; the river can only be entered by boats at high water; the beach of the same name extends some distance eastward, and is easily known by its height and whiteness; beyond it a high, steep coast of reddish color extends to Torres, which takes its name from the land terminating in its sea-face in steep, rugged, rocky pinnacles in the form of towers. A craggy islet, named Orrio, is off the NW. point of the cape with a boat-channel inshore. The cape is the extremity of a much broken promontory of reddish color, projecting to ENE., and forms the NW. limit of Gijon bay.

Cape Torres.

* Bay of Gijon.

The hill of Santa Catalina is rather more than 2 miles SE. of Torres cape, and forms the SE. limit of the bay of Gijon, which is a little more than a mile deep to SW., and is completely open to the NE. Vessels take shelter in the western part of the bay from westerly and southwesterly winds, and are there protected by cape Torres from the NW. swell. Near the cape a rocky shore commences that borders almost all the bay, and makes access to the port difficult to a stranger. The beaches of Arbeyal, farthest W., and Paseo, next to Gijon, are of sand on a bed of rock that extends out as a reef, and are separated by the low, isolated hill of Coroño. The greatest depth of water is 11 fathoms at the entrance, shoaling gradually to the shore over a rocky bottom with patches of sand, the latter predominating near the cape. The shores of the bay are generally low, increasing in height toward cape Torres. At 8

cables S. of the cape the dismantled tower of Arnao is seen on some reddish cliffs.

The westernmost of the dangers within the bay of Gijon, named Osa, is a short mile WNW. $\frac{1}{2}$ W. from the light-house on the hill of Santa Catalina. It never dries, but the weed on its summit can be seen at low spring-tides, and the sea breaks on it at low water. It is about N. of Coroño hill. The Serrapio de Mar, or Outer Serrapio, is a rocky ledge, of some extent, with less than 2 fathoms water on it at low springs. Its center is $3\frac{1}{2}$ cables N. 30° W. from the light-house, and inshore of it there are 6 fathoms water. When the sea breaks on this it breaks also on the bar, so that the pilots watch the surface of the water over it for taking the bar. San Justo bank is smaller than the latter, has about 2 fathoms water on it, and is only dangerous when there is a heavy sea. It is 3 cables N. 70° W. from Santa Catalina Castle point, and inshore of it there are 5 and 6 fathoms. Serrapio de Tierra, or Inner Serrapio, is a ledge that uncovers at half-tide, and on which the sea breaks almost constantly. It lies 3 cables W. by N. from the mouth of the basin, and with the mole and reef extending from Bocal point forms the bar of the port. The Vendaval, a no less dangerous ledge, though smaller, lies a short distance W. of the latter, and between them there is a channel named Carrero. The Cervigon or Bar rock is nearly in the middle of the bar and has 5 feet water on it at low springs, and the Juan Sancho bank, dry at low springs, is between it and the NE. part of the Inner Serrapio, assisting to contract the bar. And finally between Coroño hill and the town numerous rocks uncover at low-water, some of them one-fourth of a mile from the shore.

Santa Catalina hill, about 3 cables in extent E. and W., and 148 feet high, is connected with the main by a low narrow tongue of land. Its sides are precipitous, except to the S., where it slopes more gradually, and at the foot of this slope is the town of Gijon, with a population of about 10,500, the importance of which is steadily increasing. On the summit of the hill is a store-house, formerly the chapel of Santa Catalina; on its NW. extremity is the castle of the same name, and between these is the light-house; on the eastern part of the hill are the battery of San Pedro.

and its magazine. In the main the streets of the city are wide, paved, and clean, and the houses well built. The former Augustine convent is now a cigar manufactory employing 1,400 people. There are glass and bottle works, and fishing and salting fish are carried on to some extent. There is considerable coasting-trade in coal, grain, cider, paving-stones, and colonial produce, and some amount of foreign trade. The Spanish Armada was repaired here in 1588, and in 1810 the town was sacked and its shipping destroyed by the French.

Basin.

The port, basin, or darsena, of Gijon is 350 yards long, NW. by N. and SE. by S., and 100 yards wide, with a capacity for 80 to 100 vessels of 50 to 200 tons. It is surrounded by a stone mole, with an opening of 55 feet to the SW., between the old and new moles. A branch of the Langreo railway is carried along the latter to bring coal to the vessels loading with it. The basin dries at low water, and vessels of 13-feet draught can only enter at high springs, as at neaps there are only 11 feet water at the entrance. The bottom is rock, and outside and S. of the basin are some dangerous heads, while the channel itself is obstructed by one or two rocks. It is recommended that vessels trading here should be strongly built, capable of taking the ground, and with their keels plated with iron, on account of the rocky bottom and the swell that sometimes sets in.

Resources.

Repairs of all kinds can be effected; provisions are plentiful, and excellent water can be obtained from a fountain.

Lights: Lat. $43^{\circ} 32' 48''$ N.; long. $5^{\circ} 40' 03''$ W.

From the square, white light-tower on the hill of Santa Catalina there is displayed, at an elevation of 167 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

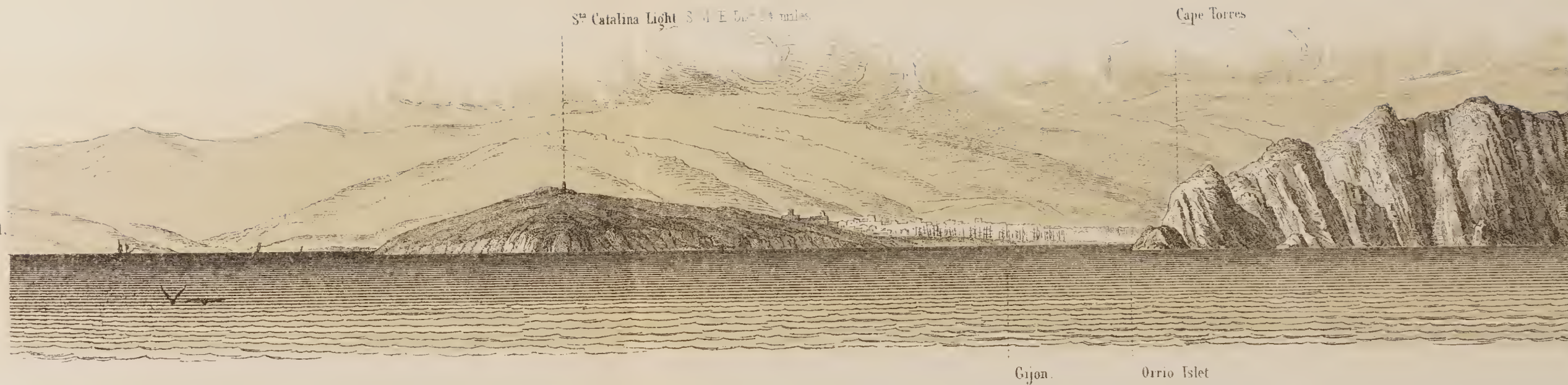
Lat. $43^{\circ} 32' 42''$ N.; long. $5^{\circ} 40' 16''$ W.

A *fixed red* light is exhibited from an iron column at the extremity of the mole extending from Bocal point, 28 feet above the sea, and visible 7 miles. A small *red* light is also seen on the north mole of the basin when within the bar.

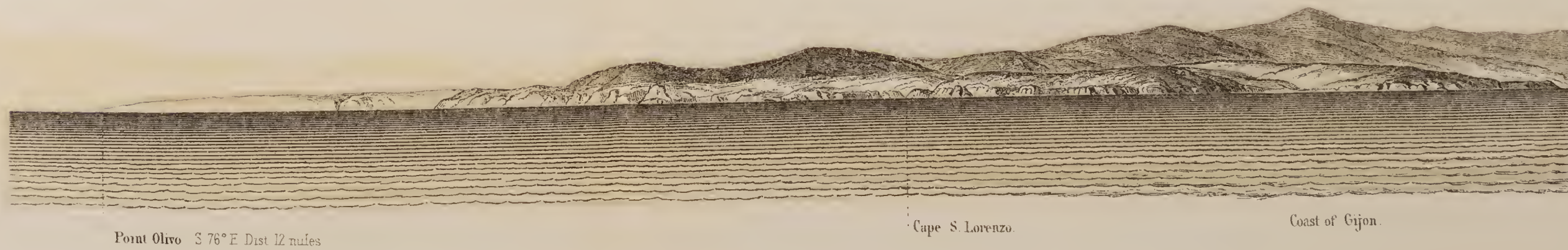
Bar.

The principal passage over the bar is between the mole extending from Bocal point and the Inner Serrapio; the greatest depth of water on it is 23 feet at high springs, and as it is narrow, vessels crossing with good way on do not receive more than one wash or heave of the sea, so the swell is rarely sufficient to prevent taking it; none, however, should attempt it without being certain that there is

Nº 31.



Nº 32.



sufficient water for the vessel at the entrance to the basin. The Carrero channel, between the Inner Serrapio and Vandalaval rock, is very narrow when there is much sea on, but is much used by fishermen and coasters locally familiar; two conical pillars on the beach, near San Estéban chapel by Natahoyo brook, lead over the bar in mid-channel.

The usual anchorage for large vessels is ESE. of cape Torres in 12 to 10 fathoms water, sand, with the town of Candás just shut in with Orrio islet, and at about 4 cables from the islet; a *red* barrel-buoy is moored in 11 fathoms at about 450 yards from the cape, with Arnao castle bearing S. 43° W., and the light-tower of Santa Catalina S. $45^{\circ} 30'$ E., to mark the anchorage and assist vessels in getting under way. Outside anchor-
ages.

Smaller craft anchor farther inshore, in 7 to 8 fathoms. A buoy, similar to and 460 yards S. 30° W. from the former, marks this anchorage. From it Arnao castle bears S. $53^{\circ} 30'$ W., and the light-tower of Santa Catalina S. $55^{\circ} 30'$ E.

There are three *red* mooring-buoys in the outer port, inside the Santa Catalina mole, and a conical *red* buoy with *white* stripe is anchored N. of the southern mole of the outer port, now building.

As the bay is open to the NE., vessels should be prepared to put to sea at once should the wind haul to the northward and blow hard, as it frequently does even in summer. Small vessels run for the basin, or if the sea is too heavy to take the bar fishing-vessels run for a little creek with a shingle-beach and protected by a reef, on the western shore of the bay, about 300 yards S. of Arnao castle.

Every vessel above 50 tons is obliged to take a pilot and a boat with a crew of nine men, for which the charges are as follows: vessels from 50 to 149 tons, for pilot and boat, 100 reals vellon (\$5) in summer, and 120 r. v. (\$6) in winter; vessels above 150 tons 120 r. v. (\$6) in summer, and 140 r. v. (\$7) in winter. The pilot is compelled under a penalty to moor the vessel well and efficiently. The summer season is from May 1 to September 30. Vessels taking a pilot on the coast pay for pilot-boat and crew about \$5 a league, (3 miles.) Directly a vessel arrives off the port a pilot goes out, and if the sea be such that he cannot Pilots.

cross the bar, he remains in the best place for receiving the vessel and waves a blue flag in the direction she is to steer. Boats for towing or for communicating with the shore may be had at a moderate price.

Tides.

It is high water, full and change, at Gijon at 3^h; springs rise 13 feet, and neaps 10 feet, with an increase of about 2 feet with NW. or SW. winds, and a corresponding decrease with NE. or SE. winds. The stream is weak, but when there is a heavy sea the eddies are strong in the channel and at the entrance.

Directions.

The position of Gijon is easily recognized by cape Peñas, cape Torres, or Santa Catalina hill. Vessels bound to Gijon from the westward should give Cape Peñas, in heavy weather, a berth of 5 or 6 miles, to avoid the heavy sea, but with SW. wind they may pass inside Somoslungo shoal, for as soon as the cape is doubled the wind will become scant.

Coast.

At a little more than 1 mile E. $\frac{1}{2}$ N. from the hill of Santa Catalina is Cervigon point, the coast between forming the bay of San Pedro, surrounded by a beach through which the Piles river empties. The bottom of the bay is of rock, with occasional light patches of sand, and there is no anchorage in it. Beyond the beach the shore is low and marshy, rising somewhat to Cervigon point, which is rocky, and similar in appearance to the hill of Santa Catalina, and off which a long reef extends. From Cervigon point a higher, rocky, and foul coast runs to northeastward, forming a considerable bay terminating at cape San Lorenzo, distant a little more than 1 mile. About the middle of this extent is the high, steep, rounded point of Punta Gorda. Cape San Lorenzo extends northward, and terminates in a low, dark, steep hill, that from E. or W. looks like an islet; the land above the cape is high, and on one of the heights are the ruins of the chapel of San Lorenzo, which, with another building on the highest land, makes a good mark for the cape. Between Cervigon point and this cape the coast is fronted with rocks, and at 1 mile distance there are only 11 to 15 fathoms water, rock. At one-fourth of a mile E. of the cape are the three low, black rocks of Estaño, with $3\frac{1}{2}$ to 4 fathoms water between them, and 7 fathoms between

them and the cape; small craft pass inshore of them at high water in fine weather.

From Cape San Lorenzo a rather low, uniform coast, with considerable vegetation about the cliffs, runs southward and eastward to point Escalera, forming Somió bay, in which the beaches of Noria, in the western part, and Aranzon, in the eastern, are the only accessible points. Escalera point projects to the N., and is only noticeable when sailing along the coast; thence a rocky shore of equal height extends to the high, slightly salient point of Peña Rubio, the western limit of España bay, the eastern limit of which is point Entornada; this latter bay is about 1 mile across, and of nearly the same depth to the S.; the bottom is foul, and only at the head of the bay there is a little beach, where the España river empties, a small stream with an impracticable bar. Point Entornada is high, rounded, and bluff to seaward; between it and cape San Lorenzo the coast is of regular height, terminating in cliffs, and skirted at about 100 yards' distance by large detached rocks that uncover at low water; at 2 cables outside the rocks there are 8 to 10 fathoms water; at 1 mile, 15 to 23 fathoms, and at 2 miles, 30 fathoms, rocky bottom; outside of 45 fathoms a sand bottom predominates. The same character of coast continues for a mile E. of Entornada point, bending to the S. to form the bay of Barqueta—locally known as Meron—in which a small stream empties; the bay is small, with a sand-beach at its head, and terminates on the E. at Coin point; on the heights scattered houses, villages, and cultivated lands are seen.

From Coin point the coast trends eastward, forming a shallow bight to Olivo point, 8 miles E. $\frac{1}{2}$ S. from cape San Lorenzo; the point projects to the N. and appears the same from E. or W., but from seaward is blended with the heights of the interior. (View 33.) A reef extends out from it for some distance, and with NW. gales the sea breaks at more than four-fifths of a mile from shore. There are 15 fathoms water, rock, at 1 mile N. of the point. The coast between Meron or Barqueta bay and Olivo point is covered with vegetation to the water's edge, but here and there it is of cliffs. It is clear of danger, and may safely be approached to the distance of a mile in fair weather.

Tazones bay. Tazones point, $1\frac{1}{4}$ miles ESE. from Olivo point, is high, and slopes suddenly to the sea; a wide, rocky ledge, that uncovers for more than 200 yards at low water, sets out for a considerable distance; the rocks that uncover are named the Ariceras. Eastward of the point is the bay of Tazones, surrounded by high lands sloping rapidly to the sea, and with a break near the middle, where the fishing-village of Tazones, with about 200 inhabitants, is built in terraces along the shore; to the north of the village is the conspicuous white chapel of San Roque, and near the sea-shore is the old square Tazones tower. The shore of the bay is rocky, and in the middle of it is a small shingle-beach, where the boats haul up. The bay terminates to the S. in Mesnada point. (View 34.) In the middle of the bay, and outside, in an easterly direction, the bottom is clean sand, good holding-ground, and the anchorage is protected from winds from NW. to SE. through W. Vessels of 300 tons may anchor in 6 to 10 fathoms water as soon as the chapel of San Roque is open of the heights of Tazones point, at which time all the village will be seen; a vessel taking the anchorage in a NW. gale should give the point a good berth.

Light: Lat. $43^{\circ} 35' 10''$ N.; long. $5^{\circ} 22' 56''$ W.

On Tazones point is a square, yellow tower with white lantern, which displays, at an elevation of 220 feet above the sea, a *fixed white* light, visible 7 miles in clear weather.

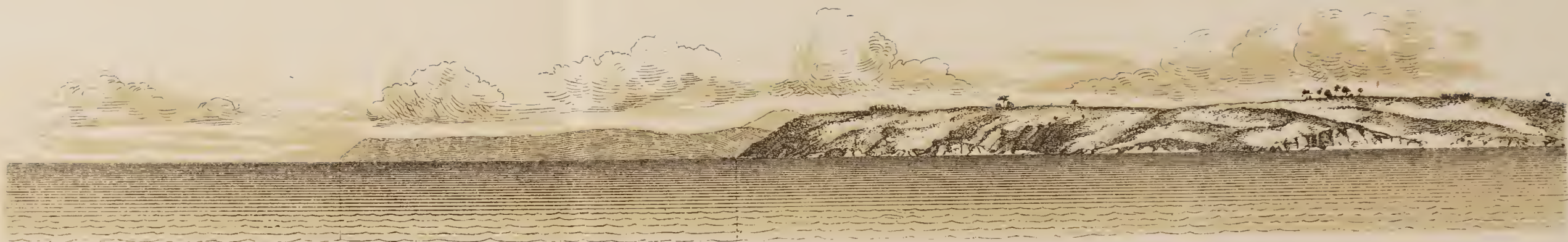
Mesnada shoal. Mesnada point is the foot of the hill, 300 feet high, of the same name; off it are some sunken rocks, the most dangerous lying about 140 yards from the point, having less than 1 fathom water on it at low tide. When the sea from NW. breaks on this rock it breaks also on Villaviciosa bar.

Villaviciosa inlet.

A short distance SE. of Mesnada hill is the hill of San Miguel, higher, but not so steep. A low, rocky point, named Punta de Barra, or Bar point, extends eastward from its foot, and forms with Rodiles bank the bar and entrance of Villaviciosa inlet. All the western shore is rocky and unequal, but the eastern is of sand, being formed by the extensive Rodiles bank, which continues eastward to the hill of the same name.

At high water Villaviciosa presents the appearance of an extensive lake, forming here and there bays and gullies, bounded by hills covered with trees, vegetation and scattered villas; but at low water the extensive banks of sand

N° 33



Cape Lastres.

Point Olivo S. 65° E. Dis. 2½ miles.

Rodiles Hill

Mesnada Hill

Tazones

N° 34



Bar of Villaviciosa

Point Mesnada S. 11° E. Dis. 1½ miles.

Peak of Sueve

Lastres S. 50° W. Dis. 4 miles.

N° 35



Carrandi Mountain.

Colunga River.

and rushes extend from the eastern nearly to the opposite shore, leaving only the main channel and numerous little channels between the marshy islets. The main channel is near the western shore, but varies somewhat in position with the shifting of the banks. The passage over the bar is about 14 yards wide at low water, and 6 to 7 feet deep; it passes close to Bar rock, which only uncovers at low spring-tides, and a pilot is necessary; one may be obtained at Tazones. Within the bar the channel is tortuous and narrow, the depth at low water varying from 11 to 18 feet. On the western shore, 4 cables within the bar, is Piedoro point, the N. extreme of a bight called Barquero anchorage, where there is a ferry. The shore of this bight is a shingle-beach, and beyond San Telmo, the southern point, is another and larger bay named Puntal, frequented by vessels because the bottom is soft and because those drawing 9 to 11 feet water can lie afloat at all times; the southern limit of this anchorage is at the lime-mole, where vessels load. Thence the channel becomes more tortuous and shoal, so that only vessels of 9 feet draught can go 1 mile farther up, and those of lighter draught to Espuncia, a loading-place for coals and merchandise conveyed by carriage to the town of Villaviciosa.

The town of Villaviciosa is pleasantly situated on the eastern shore of the inlet, about 3 miles from the sea. The Viacaba river falls into the inlet a little S. of the town. Population, 800. Exports filberts, chestnuts, citron, coal, and lime. Imports grain, etc.

Villaviciosa.

It is high water, full and change, at Villaviciosa bar at 3^h, and the rise is about 13 feet. With westerly winds there is an increase of about 2 feet in the rise, and the time of high water is an hour or more later; and the contrary obtains with easterly winds. The velocity of the flood-stream is about 3 miles an hour; the ebb is a little greater, and is still further increased at times by freshets.

Tides.

In coming from the westward the position of the inlet may be recognized by Olivo and Tazones points and the hills of Mesnada and Rodiles, and from the eastward by cape Lastres, point Tazones, and the same hills. In coming from seaward in clear weather the remarkable mountain of Carrandi, S. of Lastres, will be seen standing out clearly

Marks.

from the heights of the interior. (View 35). This mountain is an excellent mark from seaward for the ports of Gijon, Villaviciosa, Rivadesella, and the intermediate anchorages.

Rodiles point] From the bar of Villaviciosa the sands of Rodiles extend eastward to the foot of the hill of the same name. The hill is high, isolated, and flat at the summit, and is connected with the main by a tongue of low land. The rocky point of Rodiles extends in a NW. direction from its foot. During fine weather vessels usually anchor off Rodiles beach to await the tide for Villaviciosa.

Coast. Between Rodiles point and point Llastras is the shallow bay of Conejera. The coast is foul, and off the latter point are the Muelas rocks, the outermost awash at low springs, being about 400 yards off shore. Thence a regular level coast, with considerable vegetation above the cliffs, runs E. to cape Lastres, 4 miles ESE. $\frac{1}{2}$ E. from Tazones point. Cape Lastres projects northward, and is known by its level surface and its sudden slope to the sea. (View 33.) Its northern part is of reddish cliffs, and about 100 yards off its foot there is a rock named Vaca that dries at low water and has a boat-channel inside it. Foul ground extends a considerable distance, and in NW. gales the sea breaks a mile from the coast.

At $1\frac{1}{2}$ miles SE. $\frac{1}{4}$ S. from cape Lastres is point Misiera, at 200 yards off which is Plancha shoal, a ledge some 10 yards across, with 5 to 6 fathoms water on it at low tide. The rest of the coast is bold and clean.

Lastres bay and town.]

Lastres bay is only a small bight, protected from NW. winds by Misiera point and cape Lastres. The town, of about 800 inhabitants, is built on the steep slope of the shore, and a small indifferent mole affords some shelter to the fishing-boats. Vessels bound for Rivadesella with NW. winds sometimes seek shelter here, anchoring in the outer bay, in 6 or 7 fathoms water at low tide, sand and mud, with point Misiera on with cape Lastres, and the Pico del Medio, an eminence seen to the SW., in line with the hermitage of San Telmo, S. of the village and half-way up the slope of a hill. From this berth a vessel can get under way and clear cape Lastres with a NE. wind. Between it and the inner bay a long rocky ridge extends N. and S. with not less than 6 fathoms on it, and in the inner bay the bottom is sand

again. A few provisions and good water may be obtained from the town.

At two-thirds of a mile S. by E. from Lastres, the little Colunga river flows into the sea over a sandy beach. Small coasters enter the river at high water and go as far as the bridge of San Juan de Luz, about half-way to Colunga, where they load with wood and other produce. Beyond Lastres the sea-coast is lower, but to the E. of the river Colunga is a hill, named Penote, whose base is washed by the sea. A rocky point extends northward, with a short reef, and the eastern slope of the hill terminates in a rather low cliffy point, named Isla, near which is the village of the same name. A reef extends off the point and some of the rocks show. East of it is a large bay and the beach of Espasa.

Colunga river.

The high, rugged mountain of Carrandi, with the town of like name on its northern slope, is 5 miles inland, S. by E. from Lastres. It extends ENE., and WSW. with well-defined declivities toward these points, and slopes to the sea-shore between Penote and point Carreros. (View 35.) Its summit is a succession of conical peaks, the highest being the peak of Sueve, 3,710 feet above sea-level. Its remarkable shape and dark color make it easily recognizable from a long distance. One of its spurs takes a NE. direction and terminates at the sea in point Sierra or Carreros; points Atalayas and Arrobadó are terminations of other slopes. Between the two latter points is the beach of Moriz, and between Arrobadó and Carreros points is the larger beach of Vega occupying a great portion of an extensive bay. This extent of coast is much broken, with foul ground close to the shore, but navigable at a short distance. To the eastward and inland of mount Carrandi are rugged and steep mountains interspersed in great confusion, and beyond them the peaked crests of the Pyrenean chain, almost always covered with snow, are seen for more than 60 miles at sea.

Mount Carrandi.

Point Carreros or Sierra projects well northward, and terminates in cliffs from whose foot reefs extend to the north, leaving channels between them that are used by coasters in fine weather; in heavy weather the sea breaks a long way out, and an offing of $1\frac{1}{2}$ or 2 miles should be kept.

Coast.

An arm of land extends eastward from Carreros point

and terminates in a rapid declivity at the entrance to Rivadesella; its NE. extremity is called Somos or Berguiz point, and the whole of it is known as mount Somos; the northern cliffs are of reddish color, and so are the cultivated lands above them; it is 343 feet high, and on one of the eminences near the inlet is the light-house. It is similar in appearance and character to the hill of Nuestra Señora de la Guia E. of the entrance.

Rivadesella inlet.

The entrance to this inlet is nearly half a mile wide between the hills of Somos, on the W., and Guia or Corbero, on the E. Between these two is the beach of Santa Marina, a broad white crescent of sand that nearly connects them. The inlet turns to the E. along the S. side of Corbero hill in a narrow channel, 55 to 90 yards wide and carrying 8 to 21 feet at low water, bounded on the one side by a mole 8 cables long, and on the other by the Santa Marina and other sands; the only part of the mole seen from outside is its high solid head with the flag-staff; it abuts against the cliffs which descend from the heights on which stands the temple of Nuestra Señora de la Guia, and is thus easily recognized. Between the mole-head and the edge of Santa Marina bank is the bar, with 7 to 8 feet water at low spring-tides, and about 20 feet at high springs; at neaps there are 11 feet at low and 17 feet at high water. When there is much sea from the NW. it breaks between Caballo point and the mole-head and renders the bar almost impassable, but in case it should be absolutely necessary to enter, good way should be kept on the vessel to keep before the sea.

About 3 cables within the bar there is ample security in 21 feet at low water, where vessels usually anchor or secure to the mole. Small vessels go farther in, and, should they ground, the bottom is soft. Occasional dredging will be necessary to keep a good depth along the mole. The sands of the bar are somewhat banked up during heavy on-shore winds, but the channel, close to the mole-head, is kept open by the river-current.

Rivadesella.

The town of Rivadesella is scattered along the mole, and contains about 1,100 inhabitants. Exports are staves, nuts, ore, &c. Water is good, and provisions may be obtained; there are facilities for necessary repairs, but at the present day the commerce of the port is small.

On mount Somos, at the western entrance of the inlet, there is a rectangular white light-tower rising from the keeper's dwelling, from which there is displayed, at an elevation of 370 feet above sea-level, a *fixed white* light varied by a *flash every 4 minutes*, and visible 15 miles in clear weather. Light: Lat. $43^{\circ} 31'$ N.; long. $5^{\circ} 07' 06''$ W.

It is high water, full and change, at Rivadesella at 3^h, with a slight acceleration or retardation with NE. or NW. winds. Springs rise 12 feet and neaps 6 feet, varying somewhat with different winds. The ebb-stream runs 2 miles an hour at springs, increasing to 5 and 6 miles during freshets from the Sella River; at neaps it runs $1\frac{1}{2}$ miles. Tides.

Pilots go out from the town when a vessel is seen approaching; and when they cannot cross the bar stand at the mole-head and direct the vessel by waving a red flag; should it be dangerous for the vessel to attempt the bar, the flag is waved frequently to right and left, in which case she should keep off and on till a more favorable time. Pilotage is obligatory on all vessels over 50 tons. When the freshets are running strong the water is discolored, and a sailing-vessel should not enter without a commanding breeze. Pilots.

Mount Carrandi (view 35) is 8 miles WSW. of Guia hill, and its eastern slope terminates near Rivadesella, so that when bound to this port it will be sufficient to steer for the lowest visible part of the slope. On a near approach Corbero and Somos hills with the chapel of Nuestra Señora de la Guia and the light-house, the sand of Santa Marina, and, finally, the mole-head, will be seen. (View 36.) In entering, steer midway between the points of entrance, to avoid the rocks off them, and then direct for the flag-staff, passing about 35 yards from the mole-head, and follow along the mole to the anchorage. In winter, moor head and stern, with the vessel's head up the harbor, to better secure against the freshets, but in summer with the vessel's head in or out. The swell of a NW. gale is inconvenient to vessels moored in the outer part of the port, but as there is such a considerable depth of water, and so short a bar, this harbor is a better port of refuge than Gijon, where vessels of moderate draught lie aground when the tide is out. Directions.

Besides mount Carrandi, a rugged mountain, with its peaks covered with snow the greater part of the year, will

be seen terminating SSE. of Rivadesella; it is named Peña Santa, and its summits reach an altitude of 8,670 feet above the sea. It is a part of the Pyrenean range, and from the northward has the same appearance as the mountain of Monserrate.

Serropio bank. A dangerous rocky bank, 100 yards long E. and W., and with 8 to 9 fathoms water on it, lies a little more than 1 mile N. of Corbero hill, and is named Serropio. It breaks when there is a high sea; inshore of it there are 14 to 18 fathoms water, rock, and the same depth is found a short distance outside of it, increasing rapidly seaward. A vessel should pass outside of it in bad weather, even if the sea is not breaking on it. From its western summit cape Lastres bears N. 74° W., and Guia chapel S. 24° W.

Palo Verde islet. Beyond Corbero hill a steep, broken coast, low along the shore but rising rapidly inland, trends eastward for nearly a mile, to the islet of Palo Verde, which is pyramidal in shape and rather high; it is 55 yards off shore, and the channel between carries 7 to 9 fathoms, rock. A similar coast continues eastward for $1\frac{1}{2}$ miles, nearly, to the mouth of the Aguamia river, that empties through a gap in the cliffs; the eastern point of entrance is a high, prominent cliff, and the southern is low. From seaward the break in the cliffs shows the position of the river.

Nueva river. At 2 miles farther E. is the more important Nueva river, so called from the town of that name by which it passes; it falls into the sea through a little, clean, sandy beach called Cuevas de Mar. Fishing-boats seek shelter in this river in bad weather, entering at high water. Between these two streams is the unimportant cape of Villanueva and a village of the same name. The position of the Nueva river is easily recognized by the ravine and white beach, the only one between Rivadesella and cape Mar. A short distance westward and a little way off shore is the islet of Orcado de Cuevas, larger than Palo Verde, but the channel inside it is rocky and foul.

Cape Mar. From Nueva river the coast runs eastward to cape Mar, low, steep, and projecting to NE.; it is almost 7 miles E. $\frac{1}{2}$ S. from the light-house of Rivadesella. It is easily made out from E. or W., but from seaward it is blended with the cliffs in rear; it is bold, and may be closely approached in

fine weather, but in bad weather there is much sea off it. On the E. side of the cape the shore forms a bight with the little beach of San Antonio del Mar, where fishing-craft take refuge in W. and NW. gales. This anchorage can be made when it is dangerous to attempt to enter Rivadésella, and crews forced to abandon their vessels might land here.

Beyond cape Mar the coast is higher as far as cape Prieto, Coast. and the rugged peaks inland are covered with snow. The coast trends nearly ESE., with no prominent points and but few breaks, the most notable being the Concha de Carneros, though which a stream flows; it is, however, insignificant, and can hardly be made out from seaward. A little farther E. is a dark, rocky islet near the shore, that, from a distance, is blended with the cliffs, which are dark and rather low to point Huelga, at the foot of which is another islet.

The coast continues in the same direction to San Antolin San Antolin beach. point, the western limit of the beach of the same name; this is about a mile in extent, and is limited on the E. by Pistaña point, a short distance off which is an islet of the same name. The Bedon or San Antolin river falls into the sea near the western end of the beach, and in winter is a large stream. The beach at each extremity is scattered with rocks extending 2 cables out, and most of them uncover at low water. Between the rocks is a clean beach 400 yards long, the only accessible part of the whole. The beach is of remarkably white sand and shingle, and is conspicuous at a distance; many navigators have sought it for safety in a gale and have lost their lives through not being aware of the existence of the above rocks. The convent of San Antolin—the only building near the beach and E. of the river—in line with a road on the summit of a ridge, leads between the rocks, but the beach of San Antonio, near cape Mar, should be preferred, being not so flat, clean, and of white sand, and because vessels may anchor off it under favorable circumstances and be sheltered from NW. and W. winds; it is open to winds from N. to E., but life may be saved, should it be necessary to abandon the vessel.

Cape Prieto is of moderate height, slopes gradually to the Cape Prieto. sea, and terminates in low, rugged rocks that can only be seen when near the cape and E. or W. of it. The north face of the coast forming the cape commences at the eastern end

of San Antolin beach and terminates to the ENE. in a projecting rocky point, which is the true cape; on it are the ruins of a watch-tower. In this northern front there is a strip of clean beach, named Torimbria, at the head of a small bay, and some rocks that are only isolated at high water lie along the shore.

Vaca rock.

Vaca rock lies 300 yards ENE. of the cape, and one of its summits shows at low water; it is only dangerous when covered and the water is smooth, for when there is any sea it is well marked. The channel between the rock and the cape carries $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water, rock, and is used by coasters in fine weather. A low, rocky islet, named Peyes, lies about 200 yards S. of the Vaca and a reef extends westward from it, showing a head at low water that appears like another and smaller islet. The channel between the islet and Vaca rock has $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water. Jarellon islet is about 200 yards SW. of Peyes, and other islets and rocks lie closer inshore, with boat-channels between. The clean beach of Toranda, between cape Prieto and the Niembro inlet, is protected from the sea from NW. and N. by these islets, and serves as a refuge for fishing-craft during on-shore winds.

Niembro inlet.

Borizo point, half a mile SSE. $\frac{3}{4}$ E. from cape Prieto, is the W. point of entrance to Niembro inlet, which extends S. for about one-fourth of a mile, and then SW. for 200 yards, to a beautiful, fine sandy basin on the NW. and another to the SE. The E. point of entrance, called Cueva Ladrona, is 140 yards from Borizo point, and the inlet varies in width from 110 to 45 yards, with but 8 feet water at the entrance at low tide, when the interior dries. The bottom is of muddy sand, on which vessels of about 7 feet draught, that enter at high water, ground safely. The best berth is in the SE. basin near the church, and in entering, the channel on either side of Peyes islet may be used. The channel within the inlet follows the direction of the shores, and as it is rather tortuous but little sail should be carried; the rocks along the shores are marked by the discoloration of the water over them.

Niembro.

The village of Niembro, containing about 300 inhabitants, is in the NW. angle of the basin, and only the belfry of its church is seen from outside. The little river of the same

N° 36.



Mount Corbero

N^{tra} S^{ra} de la Guia
S by W Dist 1½ miles.

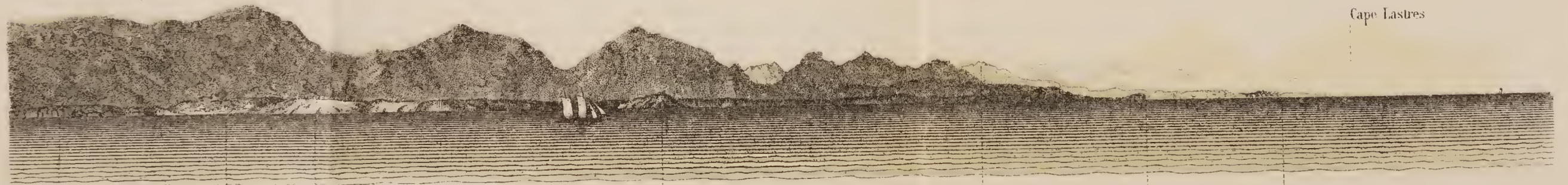
Rivadesella Inlet and S^{ta} Marina Beach

M^t Somos

Light.

Light

N° 37.



Cape Lastres

N^{tra} S^{ra} de la Guia
S 22° W Dist 1½ miles

Hanes

Pilot's Watchhouse

Jarri Tower

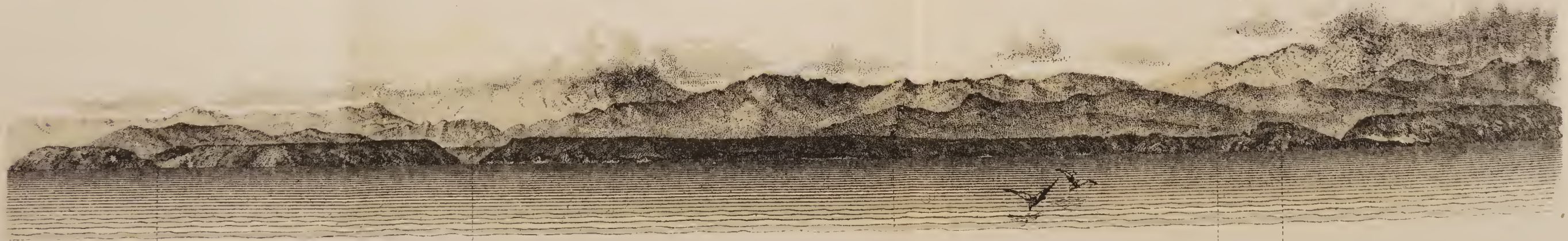
M^t Carrandi.

Cape Prieto.

Cape Mar

Urrieles Mountains

N° 38.



Tina menor

Tina mayor S. 15° E. Dist. 4 miles

Light

Santiuste Beach

Castron Islet.

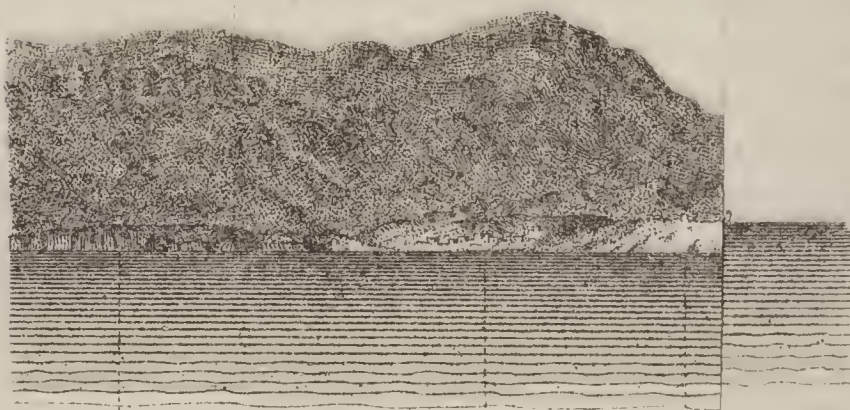
Nº 36.



Mount Corbero

Light

Nº 37.



N^{tra} S^{ra} de la Guia
S 38° W. Dist. 1½ miles.

Hanes.

P

Nº 38.



Tina menor

name discharges itself near the church, between the two basins, and the water is drinkable. Provisions are brought from Llanes, about 6 miles distant.

It is high water, full and change, at Niembro at 3^h, and high spring-tides give about 11 feet water at the entrance. The inlet dries at three-quarters ebb, so that the greatest rise of water above the ground inside the basin is 8 to 9 feet, with a little greater depth in the channel. The stream is said to run out about 1½ miles an hour. Cape Prieto is the best mark for recognizing the position of the inlet. Tides.

A short mile E. of Niembro inlet is Borizo island; it is nearly circular, steep on all sides, flat-topped, and of the same height as Borizo point, with which it is connected by a reef with scarcely enough water on it for a boat. Two low islets lie on its western side, and eastward of it is the little bay of Celorio and the islets of the same name. A stream empties through the beach of this bay, which is unimportant and unfrequented. The town of Celorio, numbering about 500 inhabitants, is in the interior, and the only buildings visible from seaward are a convent and, near it, an old Benedictine college on a cliff of the coast. Two islets, somewhat similar to Borizo, named San Martin and Almenada, are a short distance off the coast and E. of Celorio. The last named of these is in the western part of Póo bay. Borizo island.

This bay is somewhat larger than that of Celorio, and is 1 mile E. of it; it has a beach where the little river Guera empties, the mouth of which is entered by small craft at high water. The town of Póo, of about 500 inhabitants, is a little inland, and is visible from seaward. Off the point, at the eastern limit of the bay, there are several islets, the farthest out and most remarkable being named Palo de Póo; it is pyramidal in shape, and seen from E. or W. appears like a vessel under sail; it may be approached to within a short distance. Póo bay.

Eastward of these islets, and in the middle of a strip of broken coast, is Jarri point, with a tower on its summit which bears ESE. $\frac{3}{4}$ E. from cape Prieto, distant 4 miles. Jarri point is salient and steep, and has a little bay on its eastern side enumbered with rocks. Farther E. is San Pedro point, clean, and projecting to the eastward, with the round, white, pilots' watch-house on it. (View 37.) Jarri point.

Llanes.

Caballo point, a short distance SE. of San Pedro point, is low and rocky, and is the N. point of entrance to the little port of Llanes; it is in the middle of a small bight, with a beach, off which coasters anchor in fine weather when waiting for a tide to enter the port; this anchorage is in 3 fathoms, sand, near the middle of the bight, the bottom being of rock near the points. At 65 yards E. of Caballo point is a rock, named Osa, which uncovers at low-water springs; two heads of it show at ordinary low tides. There are $2\frac{3}{4}$ fathoms water, sand, between the Osa and the point, and 3 to $3\frac{1}{2}$ fathoms between it and the opposite shore. The port of Llanes is small, and only admits vessels of 6 feet draught. Its mouth opens to the E., and is between Caballo and Cal-averojondo points; it extends about 2 cables; W. by S. are moles and a small basin called the Ribera, where the small craft that enter at high water ground safely on a sand bottom at two-thirds ebb, and are protected from the swell. Vessels should only enter at high water and with a smooth sea, and a stranger should take a pilot and have the assistance of a boat, as the channel is narrow and winding. The channel on either side of the Osa may be used, the eastern being the wider but more difficult to navigate. To enter by the western channel, bring the chapel of San Anton, at the S. side of the entrance, on with the chapel of Virgen de la Guia, on a height bearing SSW., westerly, from the former. A beacon is to be placed on the Osa, and another in a convenient position for a leading mark.

Tides.

It is high water, full and change, at Llanes at 3^h; springs rise 12 feet, and the velocity of the stream is not more than 1 mile an hour.

Resourees.

The town of Llanes contains about 1,300 inhabitants. Good water may be obtained from a spring near the bridge before or after high water, and provisions are abundant. There are good pilots, who go out to meet vessels approaching.

Light: Lat. $43^{\circ} 26' 45''$ N.; long. $4^{\circ} 45' 30''$ W.

On San Antonio point, on the southern shore of the mouth of the port, there is an octagonal white light-house, attached to the keeper's dwelling, from which there is displayed, at an elevation of 64 feet above the sea, a *fixed white* light, visible 9 miles in clear weather.

The peaks called Urrieles de Llanes, a portion of the Pyrenean range, 12 miles inland, and south of the town, have an altitude of 8,900 feet, and form a good mark for the port. That named Naranjo de Bulnes, 8,622 feet high, is one of the most remarkable points of the chain, on account of its isolation, barrenness, and pyramidal form. Between the Urrieles and the coast is another chain, called Sierra de Cuera, extending E. and W., of less elevation, and from the middle of it rises mount Mojon, a remarkable conical peak, about 3,060 feet high, and less than 5 miles S. of Llanes. The Mojon and Naranjo de Bulnes in line lead to the entrance to Llanes. Aspect.

On nearing the coast, the tower of Jarri, on a height W. of the town, will be seen, with the watch-house of the pilots on San Pedro point; the church of Nuestra Señora de la Guia standing alone on a height E. of the town; and the light-house, which is 26 feet high. (View 37.)

Point Santa Clara is a projection of the cliffs of the coast, about $1\frac{1}{2}$ miles eastward of the port of Llanes, the land in rear of the cliffs being high, mountainous, and barren. Close westward of the point, and near the shore, are three islets, named the Canales, and farther W., and connected with the shore, is the islet of Toro, or Manuela. Santa Clara point.

Thence the coast runs E. by S., with high cliffs, washed by the sea, to point Ballota, a level arm of land projecting to NNE., having a little bay with a beach on the E., and another W. of it. At about 200 yards from the point is Ballota island, similar to it in appearance and steep on all sides, leaving a boat-channel between. When the island is in one, with the point bearing S. by W. $\frac{3}{4}$ W., both beaches are visible, the one to the eastward being the larger. Ballota point.

At 1 mile E. of Ballota island is the little bay of Puron, where a small stream of the same name discharges. One mile farther E. is the point of Vidiago, with the village of the same name near it, and between these points is the little islet of Portas, close to the shore. A small and foul unused bay is half a mile beyond Vidiago point, and the little rivulet of Novales empties into it. The next point eastward is Pendueles point, rocky, foul, and slightly salient, and a short distance E. of it is an islet, extending NW. and SE., called Concabada de Buelna, low, and washed over by the Coast.

swell when there is much sea; it is about 200 yards off shore, and there is but little water in the channel between.

The shore all along this extent of coast is rather high, the height of the mountains of the interior diminishing as they extend eastward. There are one or two rocks and islets off the coast, and it should be given a wide berth when the sea is heavy.

The Tinias.

From Llanes to San Vicente de la Barquera the coast is level and about 650 feet high, being only interrupted by three notable breaks or ravines, nearly equidistant from one another, named the Tinias. The first of these large bays is Tina del Oeste, or Santiuste; it extends in to the SW., but is completely obstructed by banks of sand and shingle, so that only boats and very small craft can cross the bar at high water. The little river Cabra empties at the western end of the beach. The islet of Castron de Santiuste lies in the mouth of the Tina, and nearer the western shore; it is large and rocky, rising vertically on almost all sides, and is connected to the shore by reefs that are scarcely covered at low water. When the islet bears ESE. $\frac{1}{4}$ E., the bay is open and the extensive sandy beach of the interior is seen, conspicuous from its whiteness in contrast to the darkness of the adjacent cliffs.

Tina Mayor.

The next to the eastward is Tina Mayor, a break somewhat similar to the former, but more strongly marked. (View 38.)

On the table-land formed by the coast between the two is the village of Pimiango, containing about 300 inhabitants, and on a slope of a hill not far from the shore, is the hermitage of San Emeterio; a little farther E. is the little hamlet of Tina half hidden by a grove of oaks. The inlet of Tina Mayor has become of late of considerable commercial importance on account of the mineral exports and the timber brought by the high road from the province of Liévana, in Santander. The entrance is open to the N., and is less than 150 yards wide; the channel extends in for three-quarters of a mile, and is bounded by high, steep hills on either side, but at this point the hills recede, leaving a spacious cultivated plain through which the river Deva winds, closing in again beyond the village of Bústio to form a narrow valley, through which the river flows. This river

performs the good office of keeping the inlet navigable, for the entrance is often closed after NW. gales, the sands being swept away again by the stream of the pent-up waters. The freshets of the Deva, however, cause accumulations of gravel, forming banks that uncover at low water and narrow considerably the navigable channel. The largest of these banks, named Cascajal, is about 500 yards within the bar, leaving a navigable channel W. of it only about 30 yards in width. Although vessels of 13 to 14 feet draught can enter, the inlet is only frequented by those of 9 to 11 feet, which enter the Canal del Mazo, where they are well protected and out of the swift current of the river, and where they lie aground at low water on soft mud. Small craft go as far as Bústio, about $1\frac{1}{2}$ miles from the entrance, where there is a hole with 6 feet water in it at low tide, but they can only reach it at high water, as a shingle bank in the channel dries at low tide. Bústio contained about 200 inhabitants in 1860, but was rapidly growing in importance; it has a little mole where vessels discharge, and here the road from Columbres, a town of about 500 inhabitants, terminates. At the Canal de Portilla, E. of the river, the road from Santander terminates; this canal also dries at low water.

The bar is at the entrance to the inlet and the channel, very variable in depth, but usually carrying 17 to 19 feet, is near the western shore, rocks and gravel extending nearly half-way over from the E. point; the rocks from this point extend some 300 yards northward, and then eastward to the beach of Pechon, those nearest the shore drying at low water. There are some rocks also off Tina point W. of the entrance, but they only extend out between 30 and 40 yards. There is a mooring-buoy near the entrance, belonging to one of the iron companies, and it is intended to mark the extent of the channel at the bar by a buoy on each side. To enter, bring Tina point to bear S., distant about 1 cable, and then steer S. by E. to cross the bar.

It is difficult to enter with strong NE. or NW. winds, as flaws and eddies are caused by the high land forming the entrance, and with these winds the sea breaks heavily on the bar. The entrance should not be attempted during the

river freshets, which are marked by the discoloration of the water.

The Deva and its tributary, the Cares, discharge a considerable quantity of water into the sea. During freshets the stream runs not less than 7 or 8 miles an hour, the ordinary velocity being 2 to 3 miles. The pilots say that the most favorable season for visiting the inlet is from July to September.

Tides.

It is high water, full and change, at the bar of Tina Mayor at 3^h; springs rise 9 to 10 feet, and neaps about 6 feet. The tide is felt as high as Molleda, a village less than half a mile above Bústio, on the eastern shore of the Deva. At Bústio the flood lasts 2 hours, and is then overcome by the river stream; the ebb-stream here runs 3 to 4 miles, and the flood is scarcely felt. When there is much water in the river larger craft should enter at two-thirds of the flood, and smaller vessels at half flood, so as to reach an anchorage before the ebb makes. There are no regular pilots, and vessels of any size should obtain one from Llanes. The exports are iron and timber; imports, nothing. Water may be taken almost anywhere from the river, as it is fresh nearly to the entrance.

Light: Lat. 43°
25' 15" N.; long.
4° 33' 36" W.

On San Emeterio point, 1½ miles to the westward of the entrance to Tina Mayor, there is a conical white tower 33 feet high, attached to the keeper's dwelling, from which is exhibited, at an elevation of 223 feet above the sea, a *fixed white* light, visible 15 miles in clear weather.

Marks.

The long stretch of high level coast between Llanes and San Vicente de la Barquera, with the three breaks of the Tinas, is, in itself, a good mark for this inlet, and on an approach to it the village of Pimiango is seen W., and that of Pechon E. of the port; the beach of Pechon immediately E. of the entrance is remarkably white and conspicuous. The light-house is another good mark.

The false Tinas is a name sometimes applied to Niembro inlet and the bays of San Antolin Celorio and Póo, and there is a considerable similarity to the true in thick weather, when the heights of the interior cannot be seen, but a moderate amount of care will prevent any mistake.

It is easy to leave Tina Mayor, for the land-wind never

fails about daybreak, and enables a vessel to get clear of the coast.

The currents are more felt eastward of cape Peñas than westward of it, setting WNW. in summer and E. to ESE. in winter, with an occasional velocity of 3 to 4 miles an hour, and to these currents may be attributed most of the shipwrecks of this coast. A strong current setting E. is a sure indication of a NW. gale. Currents.

The beach of Pechon is at the eastern side of the entrance to Tina Mayor, and off its western part are rocks, several of which uncover at low water. Outside the beach the bottom is rocky, the water deepening to about 25 fathoms at 2 miles off shore. The rocky point of Pechon is to the eastward, and the village of the same name stands on the N. slope of a hill midway between Tina Mayor and Tina Menor. The land over the shore is high and level like that between Tina Mayor and Santiuste, but descends unevenly and terminates in cliffs. Coast.

East of Pechon point the coast forms a small bight with a little shingle beach, limited to the eastward by a rocky islet. Then follows Vigia point, the western point of entrance to Tina Menor.

The inlet of Tina Menor, or del Este, extends S. for three-fourths of a mile, with high land on either side, in a channel 100 to 200 yards wide, when it widens out, and at high water appears to be of considerable extent; but at low tide large banks of mud and weed uncover, leaving between them only a winding shallow channel 35 to 45 yards across. The bar dries at low water, and entrance is only practicable for boats and the smallest class of vessels that bring in iron-ore to the foundries of Cades and Cosío. To enter it is necessary to keep Vigia point well aboard, and then follow the western shore to keep the channel. There is a hole, with 7 or 8 feet water in it at low tide, shortly within the entrance, and the little village of Pesués, with about 325 inhabitants, is half a mile farther in on the western shore. A small stream, called Nansa or Ason, empties into the inlet and in freshets renders entrance difficult. Canton islet, a high, black rock, is within the bar and close off the eastern shore. Tina Menor.

At two-thirds of a mile E. by N. from Vigia point is the low, rocky point of Pellerezo. The character of the high, Coast.

level land in the vicinity of the Tinajas changes from this point, descending in gentle slopes to a low, undulating coast, while the mountains of the interior, though they retain their height, become softer in outline and have few sharp peaks. A low, rocky coast runs eastward to point Liñera, projecting NW. from the foot of Boria hill, a long hill about 350 feet high that terminates at the bar of San Vicente de la Barquera. A ledge of rocks sets out from Liñera point and borders the coast at the distance of a quarter of a mile to point Silla, three-eighths of a mile ESE. $\frac{1}{4}$ E. It is called Liñera bank, is covered with 1 to 2 feet water, and is steep-to, having 5 fathoms water close outside, and $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms between it and the shore. There is an open channel through the bank that leads to the little bay of Liñera.

Harbor of San
Vicente de la
Barquera.

Castillo point, 1 cable S. by E. from Silla point, is rocky, and the two form the western points of entrance to the harbor of San Vicente de la Barquera. Between them are isolated rocks, covered at high water. At 100 yards NE. $\frac{1}{4}$ E. from Castillo point is Del Callo island, or Peña Mayor, 50 feet high, rocky and barren, and 160 yards in extent NE. and SW., and in bad weather the sea washes over it. It is connected with the point by a reef with only 3 feet water on it at low tide.

A rugged islet, named Peña Menor, lies a short distance off the NE. extremity of the island, and the channel between dries at low water. About 100 yards off the northern part of Del Callo is Plancha rock, awash at low springs.

These islets and rocks leave two channels for entering the inlet, one close to the western end of Del Callo island, and the other between the islets and Meron sands, the former being used with NW. and the latter with NE. winds. The inlet was in former times resorted to by vessels of large draught, and owned a number of ships engaged in commerce or in the whale-fisheries; but it is now so obstructed with sand-banks that it is only frequented by vessels of 9 to 11 feet draught. It runs in to the SW., and is divided by a rocky height into two arms, the western called Ria del Peral and the eastern Ria de Villegas, or Barcenal. The first extends more than $1\frac{1}{2}$ miles inland, to the barrio or district of Entrambosrios, and the other more than 3 miles, to the barrio of Bar-

cenal. By the latter flat-bottomed craft go up to the factories with iron, passing through one of the thirty-two arches of the bridge of Maza, which is 1,594 feet in length.

The town of San Vicente de la Barquera contains at the present day only about 850 inhabitants, and is divided into the old and the new town. The old houses stand on the crest of the height that divides the inlet, and the modern part is built on the eastern slope and so close to the edge of the sand that the sea occasionally reaches the doors of the houses. On the highest part of the ridge is a handsome, conspicuous white church, 230 feet above the sea, and the remains of a castle. Drinkable water may be obtained at different points, and provisions on market-days. The extensive sands of Meron commence at the western side of cape Oyhambre and extend $1\frac{3}{4}$ miles westward along the foot of mount Braña, terminating within and nearly choking up the inlet. They dry at low water springs and form various banks, with channels between them. The sand is drawing toward Del Callo island, and threatens at no distant period to unite with it, destroying the eastern channel of entrance. The best channel, after entering, is along the northern shore of the inlet, where there is enough water for vessels of 11 to 14 feet draught to go as far as Nuevo bridge, where there is a hole large enough for two or three vessels to lie afloat, moored head and stern. The only inconvenience is the swell, when it blows hard from NW. Small craft loading with timber make fast to a small quay near the town, and vessels arriving anchor off the chapel of Barquera, inside Espina point, where there is plenty of room.

San Vicente.

Merón Beach.

The bottom of the western or Peral channel is of sand and rock, and of the eastern, sand, so that the latter is preferred when it is possible to use it, but as the depth is gradually lessening it requires frequent examination. As already stated, the western channel is used with NW. winds, and the aid of a pilot is required in taking it. The long mark for this is the W. point of Del Callo island on with the remains of the old house called Casa de la Maza, (view 39,) and for the eastern channel the south side of the island in line with the church of San Vicente de la Barquera; in entering by either channel it is necessary to keep the island aboard. The old house of Maza stands on mount

Directions.

Braña eastward of Maza bridge, and between it and the new house of the same name. If forced to run in during a NW. or N. gale careful attention to the marks of the western channel must be given, and the anchor let go as soon as the vessel is inside of Castillo point. When the southernmost houses of the town are in one with Espina point, the northern shore must be followed to keep the channel. The port cannot be entered with winds from S. to SW.

Light: Lat. 43°
 $23' 30''$ N.; long.
 $4^{\circ} 25' 50''$ W.

On point Silla there is a white stone light-tower attached to the keeper's dwelling, from which there is displayed, at an elevation of 142 feet above the sea, a *fixed red* light, visible 9 miles in clear weather. The tower is 36 feet high.

Pilots.

There are licensed pilots who go out to meet vessels in the offing, or if the sea prevents their going out they remain within the bar and signal with a *blue* flag the direction in which to steer. Pilotage is obligatory on vessels of more than 50 tons. Vessels bound for Santander or other ports of the Cantabrian coast can obtain coasting pilots from San Vicente.

Tides.

The time of high water, full and change, at San Vicente de la Barquera is at 3^h ; the greatest rise is 11 to 12 feet, and the least, 5 feet. With high winds from SW. to N. there is an increase of 2 feet in the rise, and with NE. to SE. winds a corresponding decrease. The ebb-stream runs 3 knots an hour at springs, and 2 knots at neaps.

Marks.

In coming from the westward good marks for this port are found in the breaks of the Tinajas and in mount San Cosme, or Rabo del Cabo, as it is called by the sailors of the country. It should be remembered that after passing the Tinajas the height of the coast diminishes till it reaches Boria hill, which terminates in the low, rocky points of Silla and Castillo. In coming from seaward mount Escudo will be seen, rugged and barren, extending E. and W. to the southward of Barquera, and rising to a peak 3,288 feet above the sea; it bears S. $\frac{1}{2}$ E. from the summit of Boria hill. Mount Burgon, 3 miles inland, S. of Barquera, forming a cone 1,051 feet high, will also be recognized; and on a nearer approach Del Callo island and the beach of Meron will be seen. In coming from the eastward cape Oyambre is a good mark. Two conspicuous buildings at or near

the port are the hermitage of Santa Catalina, on an eminence of Boria hill, and the stronghold of Santa Cruz, on Castillo point. (View 39.)

The Peña del Zapato, or Shoe rock, is in Meron sands about 75 yards off the foot of mount Braña. Peña del Zapato.

At $1\frac{1}{2}$ miles ENE. $\frac{1}{2}$ E. from the highest part of Del Callo island is the westernmost part of cape Oyhambre. Cape Oyhambre. This cape presents to NNW. a face of 1 mile in extent, with small hills and whitish cliffs; the hills have an altitude of 150 to 170 feet, making the cape readily distinguishable from a considerable distance. On the crest is a village. It is also known by the sands of Meron on the W. and those of Rábía on the E., for nowhere on the coast between cape Prieto and San Martin de la Arena are the sands so extensive and so close together. Seen from E. or W., the cape descends in terraces to the sea. (View 42.)

A berth of 3 or 4 miles must be given cape Oyhambre in bad weather, for reefs extend more than three-fourths of a mile to NW. from the western extremity of its face, and an equal distance to ENE. from its eastern extremity; between them are numerous rocks and reefs, and the sea breaks heavily for some distance outside them. There are about 20 fathoms water at 2 miles off the cape.

On the eastern reef there is a conical rock, named La Molar. La Molar. where the sea frequently breaks, and when this is the case it breaks also on the bar of Comillas, a fact taken advantage of by the fishermen to learn the state of the bar.

On the E. side of cape Oyhambre the coast bends in to the SW., forming the bay of Rábía, surrounded by a beach of nearly the same extent, whiteness, and elevation as that of Meron; it is much encumbered with rocks, leaving only one part clear near the cape and inshore of the reefs, where the fishing-craft take shelter in gales from NW. or SW. when they cannot cross the bars of their ports. A pilot is required in passing the reefs by any one not familiar with the channels. Rábía bay and beach.

The inlet of Rábía is formed at the eastern extremity of the beach; its bar is very variable and dries at low water, but small craft can lie afloat inside. The long, low islet of Rábía lying E. and W., fronts the bar and is surrounded by sand at low water. Only a very small class of vessels enter

the inlet to load with building-timber for La Barquera; it should be approached at the western end of the islet, and only at high water and in fine weather, as it breaks on the bar when there is any sea; vessels go as high as the bridge of Rábia, which crosses the inlet at the road to Comillas.

Coast.

Beyond the Rábia islet is the rocky point of Cabrero, with a reef setting out from it to the NW., and then a small bend in the coast, with one or two patches of beach, terminating at Mória point. From Mória point, which is formed of rather low cliffs, reefs extend some distance out, the most formidable being named Moro; on a slight elevation on the point are the remains of a watch-house, $2\frac{1}{2}$ miles ESE. $\frac{1}{8}$ E. from the most projecting point of cape Oyhambre.

At a short distance E. of Mória point is point Castillo, from which reefs extend to the NE., and act as a break-water for the little bay in which is the port of Comillas; on the point are the remains of an old fort.

Port Comillas.

The port of Comillas is in a little bay E. of point Castillo, and is formed of two piers inclosing sufficient space for the fishing-boats of the neighboring coast, and with an entrance about 8 yards wide. The town, with a population of about 1,300, is 1 mile S. by E. from Castillo point. The port opens to the southward, and is dry at low water, with bottom of muddy sand. The channel is narrow, tortuous, and difficult; and can only be taken in moderate weather with the assistance of a pilot and boats. Vessels of 120 tons sometimes enter to load with minerals, but it is inconvenient for those of greater burden than 70 to 80 tons, and only ten of these are admitted at one time, so as to leave room for the smaller craft. When there is much sea outside, the entrance is somewhat protected by a kind of half-gate formed of strong wooden bars, to prevent injury to the vessels by the swell in the basin. There is a flag-staff on an eminence near the port, where a white ball is hoisted to warn a vessel not to enter, either because the basin is occupied or on account of the state of the bar.

Lights.

Two conical white pillars are placed on the heights, and when in line lead to the middle of the bar; a light is displayed on each of these when vessels are outside at night,

Casa de la Maza

Mount Escudo.

Mount Burçon



Merón Beach.

Peña menor

W. Point of del Callo 1st on with the old
casa de la Maza S 1° W Dist 0.6 of a mile.

Ruins of Castle

S^{ta} Catalina Hermitage.
S. 33° W

Mount Escudo

Comillas



Calcination Establishment

S^{ta} Lucia.

Mole. S by W. Dist 1 mile.

Cape Lata

Entrance to San Martín de la Arena.

Mogro Peak.

Lienres Point

Cabrera Island on with Lienres Beach
S 35° E Dist 10½ miles

P^t Ballota S 76° E.



when the weather is bad, and also a temporary fire is made as a guide for the fishing-craft.

Channel-buoys are placed that also serve as mooring-buoys for vessels waiting for a tide.

The position of Comillas is readily made out, by the establishment for calcining minerals, which is a little more than half a mile ESE. of the port, and, with its chimneys and workshops, the only buildings of the kind on the coast, is very conspicuous. At the same time the walls of the mole, the storehouses, and the masts of the vessels inside, the signal-staff, the village scattered over a hill, the hermitage of Santa Lucia, and the ruins of a church a little farther to the SW., will be seen. (View 40.) Marks.

If to the westward of the port, cape Oyhambre, the beaches of Rábia and Meron, and the heights over San Vicente de la Barquera, are good marks. If to the eastward, the islands at the entrance to San Martin de la Arena, the town of Suances, the beach of Luaña, and the church of Nuestra Señora de los Remedios.

Comillas will not be mistaken for San Vicente de la Barquera, if it be observed that the former is to the E. and the latter to the W. of the beaches of Rábia and Meron.

A little more than 1 mile eastward of Comillas is the rather high, rocky point of Miradorio, with some reefs off it. Between this point and the port is a bay with a little foul beach, and at the head of the bay a brook empties. To the eastward of the brook, near the sea-shore and at the foot of the cliffs of Miradorio point, is the establishment for the calcination of minerals above described, from which the mines are but a short distance. Coast.

At a little more than half a mile NE. of Miradorio point is Remedios point, projecting to the N., and with a reef extending a short distance off it. Two large caverns, remarkable from their dark color, appear in the cliffs E. of the point. The church of Nuestra Señora de los Remedios, conspicuous from its size and its isolated position, stands on a hill above the point, a little way from the shore, and is a good mark for Comillas.

To the northward of the above points, and $3\frac{1}{2}$ to 4 miles from the coast, are two rocky banks that are dangerous when there is much sea. The western bank, Luaña, is the Luaña and Tor-
riente banks.

smaller, and has 11 to 17 fathoms water on it, and 35 to 45 fathoms at its outer edge, increasing to 55 fathoms, mud; and between the bank and the coast there are 27 to 32 fathoms, sand and rock. From the least water on the bank Cabrera or Suances island bears E.; Luaña beach S. 25° E.; the church of San Vicente de la Barquera S. 59° W.; and mount San Cosme S. 66° W. It breaks with much sea from NW., and its breakers are extremely heavy.

Torriente bank, 2 miles ENE. of Luaña bank and 4 miles from the coast, is about 200 yards in extent NW. and SE.; the least soundings on it are 10 to 12 fathoms, with 45 to 55 fathoms, mud, on its northern edge, and 27 to 37 fathoms between it and the shore. From the least depth on it Cabrera island bears S. 85° E.; Luaña beach S. 2° E.; cape Oyambre S. 61° W.; and mount San Cosme S. 66° W.

The Torriente breaks when the Luaña does, and in NW. winds a vessel should pass outside them and at a good distance, but there is no danger in passing over either in fine weather. Views 41 and 42 were taken from the least water on Torriente bank.

San Vicente de
Luaña.

At about 1 mile E. of point Remedios is that of Ruiloba or Luaña, the western point of entrance to the bay of San Vicente de Luaña, which is surrounded by a beach. Near the point is the hermitage of San Vicente, and on the heights over the point and a little inland is the village of Ruiloba. The bay of Luaña, formerly a little fishing-port, is now obstructed with sands, that form a clean, extensive beach, conspicuous from a distance. A small river descends through a ravine over the beach to the sea. To the eastward of point Ruiloba, and the rocks which surround it, fishing-craft find shelter from winds from NW. to SW. A vessel under the necessity of running ashore to save the crew, should select the middle of Luaña beach at high water, if possible, or on the ebb. This is the only beach of much extent between Comillas and San Martin de la Arena.

Coast.

From San Vicente de Luaña the coast runs northeastward, low but increasing in height, to Carrastrada point, 2 miles distant. This point is quite salient, with outlying rocks,

and on its western side there is a little bight, with a clean sandy bottom in the center, but rocky about the shore.

Thence the coast, rugged, and with ravines, trends E. by N. 2 miles to Calderon point, low, rocky, and salient, and commanded by high land. The point is subdivided into two, one projecting to NE. and the other to NW., and these respectively afford shelter from westerly and easterly winds; the bottom is sandy, but the shore rocky. At a short distance from the coast the soundings are 13 to 22 fathoms. To the NE. of the point the coast is higher and undulating; it is covered in places with vegetation, but is generally bare, showing the whitish rock of which it is formed.

The church of San Pedro stands between the points of a hill near the sea-shore, between the points of Carrastrada and Calderon, and is conspicuous for a moderate distance on account of its tower and its isolation. It is the church of a number of villages in the vicinity. On Calderon point is a well-defined conical hill, named Maorteo, which, in line with a similar peak a short distance inland, is a mark for Torriente bank.

From Calderon point the coast increases in height to the beach of Santa Justa, at the head of a little, foul bay. The chapel of Santa Justa stands on the shore close to the rocks on the western shore; at a short distance eastward from this beach, and separated from it by a rocky ridge, on which are the remains of a watch-tower, is the beach of Las Arenas, more extensive, but equally foul.

Ballota, locally called Negra point, is a remarkable, steep, black point, $1\frac{1}{2}$ miles NE. by N. from Santa Justa; it projects northward; reefs extend from it, and Percebera rock, about the size of a ship's launch, lies a short distance from its extremity, and dries at low water. There is a passage inside the rock for small craft, and outside it is steep-to, and may be approached boldly.

From Ballota point the coast turns to the SE., and forms the bay of Garrera, that terminates at Dichoso point. A small, foul beach terminates at a little eminence about 85 feet high, on which are the ruins of the watch-tower of Buey. Outside the bay the bottom is clean and the water deep.

Dichoso point, the W. point of entrance to San Martin Dichoso point.

de la Arena, is low, barren, and of whitish rocks, with a rounded hill on it, called Alto del Dichoso. It is connected with the main by a low isthmus, so that when seen from any distance from the westward it appears like an island.

Canto bank.

A bank, about 20 yards in extent NW. and SE., lies 2 miles NE. $\frac{3}{4}$ N., nearly, from Dichoso point. There are 15 and 16 fathoms water on the bank, with 25 to 28 fathoms between it and the point, decreasing to 17 fathoms near the point; outside of it the water deepens rapidly to 35, 45, and 55 fathoms. It is named Canto bank, and in high winds there is a heavy sea on it, and it is necessary to give it a good berth. When it breaks on Luaña and Torriente banks, it breaks on the Canto also, and this is probably a part of the same submarine chain.

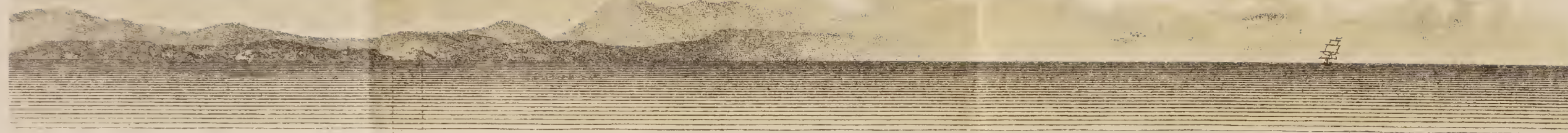
Inlet of San
Martin de la Are-
na.

The entrance to San Martin de la Arena, or Suances inlet, is between Dichoso point on the W. and Cuerno point, distant a little more than a mile E. by N. The true entrance, however, is between Afuera and Torco de Afuera points, and is less than half a mile wide; it is entirely open to the N., and the points of Dichoso and Torco afford but slight shelter from NW. and W. winds. The inlet is navigable for vessels of 13 feet draught as far as Requejada, about 5 miles from the mouth, but the bar shifts so constantly in position and extent that it is inconvenient for vessels of more than 10 feet. Inside the entrance large banks uncover at low water on either side, leaving a channel 100 to 200 yards wide, with a generally muddy bottom. The shores are low and undulating, the table-land, named Meseta de Cortiguera, being the highest; both shores are covered with woods and meadows, and scattered with villages and farm-houses; the most important village of the inlet is Suances, on a height on the western shore; this is the first village in entering, contains about 550 inhabitants, and is the residence of the pilots, the marine authorities, and the health officer.

Requejada, near which is the principal anchorage, is a small village, with large granaries, which give it an imposing appearance, and the view of the cultivated fields, the villages, woods, and hills, from this point, is very beautiful. Foreign vessels having grain and railway *matériel* proceed here to discharge, but no other description of merchandise

M^o San Cosme S 66° W.

N^o 42



Cape Oyambre S 61° W Dist 1 mile

San Vicente de la Barquera

N^o 43



W Point of Conejos I^{la} S 30° E Dist 1 mile

Inlet of San Martin de la Arena

Point Torco de Afuera

Atalaya del Buey S 17° W

Point San Juan del Canal

Liencres

Heights of Liencres

N^o 44



Cape Mayor Light N 26° E Dist 9 1/2 miles

Sands of Liencres or Val de Arena

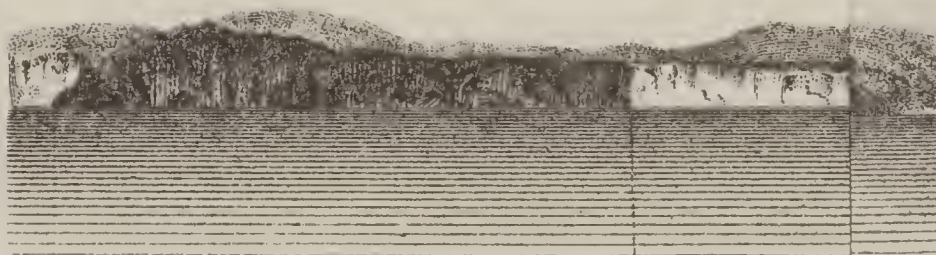
Point Aguila S 52° W

Nº 42



Cape Oyambre S 61° W Dist 6 mi

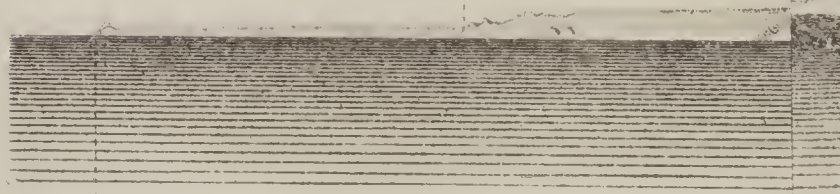
Nº 43.



W. Point of Conejos I^d S. 30° E Dist. 1 mile.

Point San Juan del Cana

Nº 44.



Cape Mayor Light. N. 86° E Dist 9½ miles.

is allowed to be disembarked; vessels arriving in ballast discharge it at Suances. At the Requejada anchorage there are 12 and 13 feet water, mud, at low tide.

Every gale and every freshet of the river changes the bar; when the latter is strong the water forces itself through the sand, and a channel 6 or 7 feet deep is formed, while a gale from the northward accumulates the sands so that they dry at low water. When the navigable part of the bar is near point Torco de Afuera, after passing the bar with cross-winds, great care is necessary to keep the channel, which turns to ESE. to Marzan point, as the sea sweeps over the banks, setting the vessel toward them. The average depth of water over it at low spring-tides is about 2 feet; and as there is always a small lift of the sea on the bar, a vessel entering should allow 4 or 5 feet for her descend. The bar may be taken with all winds except those from SE. through S. to SW., whenever the state of the tide and sea permit. When there is a heavy freshet, which will be known by the discoloration of the water some distance outside, the entrance should not be attempted on account of the strength of the stream. A vessel of any size should take a pilot, who will go out to meet her, or, if the sea do not admit of this, will board her within the bar.

The Saja and Besaya rivers discharge so much water into the inlet during the rainy season that it overcomes the stream of the flood and renders it difficult for a vessel to make way against it.

Vessels after crossing the bar that cannot reach Requejada anchorage on one tide may come to at Cantos anchorage off the harbor-master's house, beyond Hornillo point, on the western shore. Water may be obtained near Cantos landing or at Requejada.

On point Torco de Afuera there is a white, conical tower 30 feet high, with green lantern, and attached to the keeper's dwelling, from which there is displayed, at an elevation of 118 feet above the sea, a *fixed white* light, visible 7 miles in clear weather.

It is high water, full and change, at San Martin de la Arena inlet at 3^h; springs rise 11 to 12 feet, and neaps 7 feet; there is an increase of 1 or 2 feet in the rise, with winds from SW. to NW., and a corresponding decrease with

Bar.

Saja and Besaya rivers.

Cantos anchorage.

Light: Lat. 43° 26' 50" N.; long. 4° 00' 56" W.

Tides.

winds from the opposite direction. The velocity of the stream at springs is about 4 miles an hour between Atalaya and Marzan points, and it follows the direction of the channel; this velocity is considerably augmented during freshets.

Pilots.

Pilotage is obligatory on vessels of more than 50 tons. It has been stated that a pilot goes out to meet a vessel approaching; if this is impracticable, signals are made by one of the pilots from the Atalaya, a small green hillock about 55 feet high, the first point on the western side within the entrance.

Signals.

From the Atalaya the bar and channel are distinctly seen, and a *white* flag is used to communicate with the vessel, which must pay careful attention to the signals. While the flag is held upright the vessel is to keep on her course, but if pointed to left or right steer in that direction until the flag is again upright. When the bar is crossed a pilot boards and takes charge of the vessel. If there is too much sea on the bar, or too little water, the flag is waved from side to side, and the vessel should stand off; if on returning to the entrance the flag is held stationary, the vessel may enter, but her draught and the state of the tide should be considered. Although there is no extra charge for the *atalayero*, or signal-man, it is usual to pay him 20 reals as a gratuity.

Directions.

The position of Suances inlet is easily determined at a considerable distance. If the low coast-land cannot be made out, and the high lands of the interior are clear, the peak of Viérnoles, 1,600 feet above the sea, S. $\frac{1}{2}$ E. from the entrance, is a good distant mark. If nearer the coast the beach and heights of Liencres, the peak of Mogro and Conejos island, are good marks eastward of the inlet, while to the westward are the high, steep point of Ballota, the table-lands of Cortiguera, the light-tower, and the heights, 400 feet above the sea, on which stand the village and church of Suances. (Views 43 and 44.) On a near approach, the sands at the entrance to the inlet will be seen, with Torco castle, the remains of a lookout on Dichoso point, and the ruins of the Torrejon, an ancient tower, on a little hill at the middle of the inlet. The western point of entrance and the extremity of Conejos island may be boldly approached, but

if necessary to tack to reach the bar, Cuerno point should be given a good berth on account of the rocks off it.

Cuerno point, which limits the inlet to the E., is moderately high, falling gradually to the sea on the northern side, and terminating in a reef that connects it with Demetria island; off the western part of the point are several reefs and rocks, the farthest out being Joaquina and Xarillo rocks. Between point Cuerno and Afuera point, the nearest the bar is Umbrera point, separating this portion of the inlet into two bays scattered with rocks, many of which uncover at low water. The western bay is the larger, and contains a small beach, named Patrocinio; the shore of the other is steep rock. Cuerno point

The Suances are a group of five islands N. of Cuerno point, and the largest and farthest out is Cabrera, or Conejos island; it is 400 yards long E. and W., and 100 yards wide; is steep on all sides, difficult of access, and highest toward the eastern end, where it attains an elevation of 175 feet. When seen from the westward it appears small and square from being end-on, and it is a good mark for the inlet. It is steep-to, and the only dangers near it are some rocks close to its southern side. The W. point of this island is about one-third of a mile NW. $\frac{1}{4}$ N. from Cuerno point. Suances islands.

Between Conejos island and Cuerno point is Demetria island, low, rugged, and surrounded by reefs; there is a clear, narrow channel between these two islands, carrying $4\frac{1}{2}$ to $5\frac{1}{2}$ fathoms water, but no channel between Demetria and the point, except for the smallest craft at high water.

The three other islands, Casilda, Segunda, and Solita, are rocky islets lying E. of Demetria, with channels between them for small craft.

From Cuerno point a rocky, broken coast runs south-eastward to the small clear beach of Usgo, and then eastward to Aguila point, with an islet off it 1 mile E. $\frac{3}{8}$ S. from Cuerno point. East of this point is the mouth of the Pas or Mogro river, a small stream whose bar dries at low water; the bar is only practicable for boats. The village of Mogro is on the northern slope of the peak of the same name; this is a little conical peak with an attitude of 535 Coast.

feet, isolated, and a good mark for the inlet of San Martin de la Arena.

At $2\frac{1}{2}$ miles ENE. $\frac{1}{8}$ E. from Cuerno point is point Somocueva, and between them the coast forms a bay, in which are the extensive sands of Val-de-Arena or Liencres, commencing at Aguila point and terminating at that of Somocueva; it is also called Arenas Gordas, from its similarity to the sands of that name between Sanlúcar and Huelva. This beach is of reddish color, and extends in from the shore and about 165 feet up the slope of the heights of Liencres, and can be seen at a distance of 15 miles. It is a good mark for this part of the coast; it is, however, of little advantage to a vessel obliged to run ashore, for though it is clean and level, the breakers extend a long way out.

Above the beach, between the peak of Mogro and Somocueva point, rise the heights of Liencres. (View 44.) They are of dark color, extend $1\frac{1}{2}$ miles NNE. and SSW., and in the southern part are two well-defined peaks, forming a saddle, the southern peak being the higher and rising 695 feet above the sea. The town of Liencres, remarkable by its high church-tower, is at the foot of the heights on the northern side. The heights form a good mark for Santander, as they are the only high land near the sea between Suances and Santander, and cannot be mistaken.

Somocueva, also called Liencres, point extends westward, and on its southern side there is a little cove or bay of the same name, terminating in a clean beach. Fishing-craft find shelter in it during NE. winds. It might also be possible for a vessel embayed between Somocueva point and Suances to make this bay if unable to double the point, and life at least might be saved. The mariner is warned not to mistake, in thick weather, the bay of Val-de-Arena for the entrance to Santander inlet, by taking Mogro peak for that of Cavada, and the Liencres for the Puntal sands eastward of cape Mayor.

From Somocueva point the coast trends eastward a short distance, and then northward to point San Juan del Canal, distant $2\frac{1}{4}$ miles; this extent of coast is low, broken, and cliffy, with occasional sandy beaches. It is fronted at a short distance off shore by a chain of pyramidal and conical rocks that leave channels for boats between and inshore of

them; but outside them the bottom is foul, and large vessels should give them a wide berth; they are named Urros de Liencres.

On the eastern side of the steep point of San Juan del Canal there is a little bay extending in to SW., and terminating in a beach used as a boat-harbor with westerly winds, when the sea is smooth. The church of San Juan is on a height at the head of the bay, somewhat back from the shore; a few houses are scattered nearer the shore, and the remains of a look-out are seen on the highest part of the point. Bay of San Juan del Canal.

At about a mile E. $\frac{3}{4}$ N. from the extremity of San Juan del Canal point is a low, rocky islet connected with the main by a bridge; its greatest extent is NE. and SW., and it takes its name from the hermitage of Nuestra Señora del Mar, which is on its summit. The coast between the point and islet is foul.

At $1\frac{1}{2}$ miles E. by N. from the islet is the low, rugged point of San Pedro del Mar, and E. of it is a small open bay of the same name, with a sandy beach and with a battery on its eastern point. From the W. part of the bay the narrow inlet of San Pedro del Mar extends in to the westward, in which fishing-craft take shelter during winds from NE. to E.; but with any sea from the NW. it cannot be entered, as the sea then breaks on the bar, which is of rock. There is a water-mill in the inlet, and the boats which go up to it at high water lie there in safety. Inlet of San Pedro del Mar.

A rocky bank, named Cabezo de San Pedro del Mar, of considerable extent E. and W., lies $1\frac{1}{2}$ miles from shore off San Pedro del Mar. It has 10 to 12 fathoms water on it at low tide, and 20 fathoms between it and the coast. The sea often breaks over it and near it, and a vessel should either give it a good berth or pass inside it. From the least water (10 fathoms) on it Santander light bears ESE., the hermitage of Nuestra Señora del Mar SW. $\frac{5}{8}$ S., and the W. point of Conejos island WSW. $\frac{3}{4}$ W. The roof of the hermitage of Virgen del Mar is on with the middle of the road to Santander, both objects a little to the W. of the peak of Viernoles, and Conejos island appears within Ballota point. Cabezo de San Pedro del Mar.

Cape Mayor.

At two-thirds of a mile NE. by E. $\frac{3}{8}$ E. from point San Pedro del Mar is Cortada point, and at the same distance farther eastward is cape Lata, with Ansion islet off its NW. part and a boat-channel between.

All this extent of coast is low and rocky, but higher toward the interior, forming a long and even range as far as cape Mayor. An inner range running E. and W., named the Alameda Alta de Santander, the village of Cueto, and a number of houses and buildings are seen, and above these ridges the Peña Castillo, 396 feet high, rises from the shore of Santander inlet.

From cape Lata the coast runs eastward, rising gradually to cape Mayor, 200 feet high, clean and steep-to.

CHAPTER IV.

FROM CAPE MAYOR TO SANTURRARAN POINT.

Variation in 1876.—Santoña, $18^{\circ} 45'$ westerly; Bilbao, $18^{\circ} 35'$ westerly.

Cape Mayor, the western point of entrance to Santander inlet, terminates to the NE. in a high point, called Pico del Gallo or Morro, though the former name is sometimes given to a steep W. of the light-house on this point. The coast from Somocueva to cape Mayor should be given a wide berth, especially if not bound to Santander, for the 20-fathom line is 2 miles from shore, and the sea from NW. breaks a long way out. Even to a depth of 30 fathoms the sea is apt to be very heavy. Cape Mayor.

From cape Mayor the coast trends southward for about half a mile, to cape Menor, which projects eastward in a low point, terminating in a short reef. There is a battery on the summit of the cape. Cape Menor.

Santander inlet, forming the best port on the N. coast of Spain E. of cape Ortegal, runs in 5 miles to the SW. and appears like a large lake at high water; but when the tide is out large banks of sand, mud, and weed uncover, leaving channels between, the best being that which follows the northern shore of the inlet to the town of Santander, where it turns to the S. and extends to the village of Guarnizo. This channel, the real port of Santander, is 300 to 600 yards wide, and is navigable almost throughout for large vessels, as it carries $1\frac{3}{4}$ to $5\frac{1}{2}$ fathoms at low water. The entrance to the inlet is between cape Mayor and Santa Marina island, $2\frac{1}{2}$ miles ESE. Santander inlet.

Point Caballo, 1 mile SSE. $\frac{3}{4}$ E. from cape Menor, is steep and salient to NE. The coast retreats between the cape and point to form the bay of Sardinero that terminates in a clean, level beach, and forms a fair-weather anchorage for vessels awaiting daylight or a favorable tide. The best anchorage for large vessels is 400 to 600 yards from cape

Menor, with it in line with cape Mayor, in 8 to 10 fathoms water, sand; farther S. the bottom is of rock and stone. In making this anchorage when there is much sea from NW. a good berth should be given cape Menor, as the sea often breaks a considerable distance from it. Vessels should never anchor here if there is any prospect of a NE. wind setting in. There are three batteries on the shore of the bay; and on Ano point, eastward of Caballo, there is a telegraph and signal station, on the site of the old castle of Ano.

At one-third of a mile SE. by S. from Caballo point is point Puerto, low and rocky, but with a rugged eminence rising from it, on which are seen the remains of a fort; between these points the coast presents a rocky front to NE., and between this front and Mouro island is the channel of entrance to the port.

Mouro, sometimes called Mogro, island lies about half a mile ENE. $\frac{1}{2}$ E. from Caballo point; it is rugged, nearly circular, less than 200 yards in diameter, and about 90 feet high, with a light-tower on it. (Views 45 and 46.) During a gale from N. or NW. the island is enveloped in spray. It is steep-to on the N. and E., but a bank with $4\frac{1}{2}$ fathoms at its edge extends for 400 to 600 yards S. and SW. of it; and at 100 yards E. of the island is the small rocky islet of Corvera; there are $2\frac{1}{4}$ fathoms in the channel between, but three rocks lie in this channel.

From Puerto point, on which there is a light-house, the coast runs SW. for 300 yards, and at about the middle of this extent is Cerda castle. The coast then bends northward to form a bay that terminates at Promontory point, WSW. $\frac{1}{4}$ W. from the castle and three-fourths of a mile distant. This point is of moderate height, rocky and steep-to, so that it may be boldly approached. The bay is full of rocks; close to the shore, and joined to it at low water, is Latorre islet, low, and divided into two parts united by a natural bridge; a tower stands on the southern part of the islet; there is shoal water all around it, and at 150 yards SW. of it there is a rocky bank with 8 feet water on it. At a little more than 200 yards SE. of Latorre, and between 500 and 600 yards SW. $\frac{5}{8}$ W. from point Puerto, is a smaller islet, named Horadada, pierced through so as to resemble two

Nº 45



Light. S. 21° E. Dist. 3½ miles

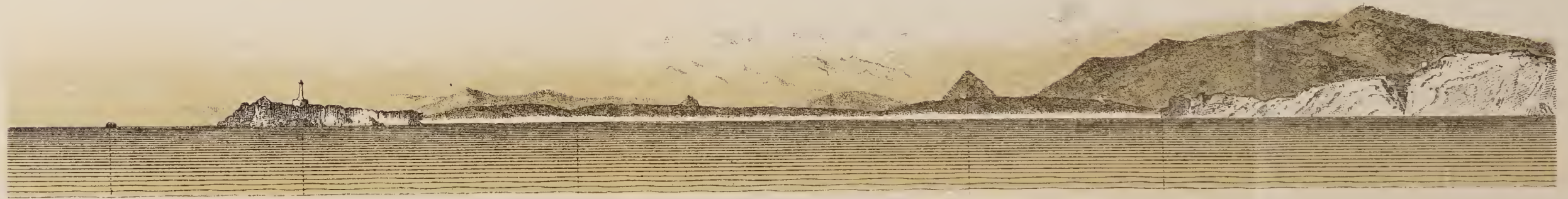
Puntal Sands.

Mouro Island and Light.

Cape Mayor.

M^t Cabarga

Nº 46



Corvera Islet.

Mouro Id and Light S. 30° E.
Dist ¾ of a mile.

Puntal Sands.

Cabada Hill (leads in)

Point Puerto (No. not shown in sketch.)

Mount Santoña

Nº 47.



Cape Quejo. Cape Ajo.

Cape Quintres S. 63° E. Dist 8 miles

rocks connected by a stone bridge. There is but little depth of water around it. A white tower marks the islet.

Two shoal spots lie southward of Latorre islet; the farthest, with $2\frac{1}{2}$ fathoms on it, being in line with Horadada islet and the light-house on Puerto point.

Point San Martin, with a castle of the same name on its summit, is the next prominent point WSW. from Promontorio, and on its western side are five rocks, called the Hermanas. Between these points is a shallow bight 600 yards wide, with a number of rocks in it.

Alto de Miranda is a hill 280 feet high in rear of point San Martin. The village of Miranda is on its summit.

The mole of Santander commences at a little more than half a mile W. of San Martin point; it is solid and well paved, is more than 600 yards long in a W. by S. direction, and terminates in a recess named the Dársena or basin; at its eastern extremity is a smaller basin, called the "little port." A handsome line of houses extends along the rear of the mole facing south; and the captain of the port's residence, the health-office, and custom-house are situated on the mole.

Westward of the Dársena are three jetties at the end of Maliano quay, which extend thence for three-fourths of a mile southwestward, to the entrance to the proposed new basin, opening from the main channel.

The city of Santander, and capital of the province of the same name, is well built, and extends northward and westward on the sides of two small hills crowned with trees, which contribute to its picturesque effect; an elm-planted road surrounds the entire city; in the more ancient quarter the streets are straight and narrow, and the houses lofty, while in the modern the streets are spacious, and the houses of moderate height but good architecture. There are a number of public buildings, educational and charitable institutions, and places of amusement. The cathedral stands on the summit of the hill that runs along the shore of the inlet, at the foot of which commences the line of rail to Castile, the only line in N. Spain just now in use. There is steam communication with England, France, Malaga, and Cadiz. A cigar manufactory, employing about 1,060 persons, occupies the suppressed nunnery of Santa Cruz, and

Santander.

in all ways Santander appears to be a busy, thriving, and, at the same time, a cheap and well-provided place, containing all the resources looked for in a commercial port. The fish, both of sea and fresh water, are plentiful and excellent. Water is obtained alongside from tanks and from fountains at the mole. Coal can now only be obtained at Santander or Pasages. A great portion of the trade of the city is with Cuba. In 1872, 392 ships entered and left the port, with tonnage 114,165, besides tonnage 93,837 of coasters. The imports consist chiefly of sugar, cocoa, textile fabrics, salted codfish, pitch, tobacco, &c.; exports, iron and copper ores, quicksilver, cobalt, wheat, wool, olive-oil, and flour. Population, about 30,000 in 1874.

At the wooden jetty, where almost all of the warehouses are collected, the larger class of vessels can make fast at high water, smaller craft only being able to make fast to the mole at high water, and they lie aground when the tide is out. Vessels in the stream moor with the longer scope to the southern anchor. The southerly gales of the winter frequently prevent communication with shore, boats being unable to land on account of the high sea breaking against the quays.

Peña Castillo. The shore of the inlet still trends westward after passing the mole of Santander, and at two miles from the city and near the water's edge rises a hill, named Peña Castillo; it extends nearly half a mile E. and W., and is 396 feet high; from the eastward it appears like a conical peak.

Maliaño point. From here the coast turns to southward, and then eastward to Maliaño point, $2\frac{1}{2}$ miles S. $\frac{5}{8}$ W. from the elbow of the mole; the large bay W. of the line joining these two points is almost completely choked with banks that dry at low water, and leave but a few narrow and tortuous channels between.

The dock-yard and village of Guarnizo are nearly $1\frac{1}{4}$ miles S. of Maliaño point, the coast between bending to the westward to form a considerable bay, almost entirely obstructed by banks of mud and sand. Beyond Guarnizo the channel is narrow and shoal, although it receives the waters of the Puente Solía river, an unimportant stream. A number of villages are scattered over all the northern coast of the inlet above described.

Opposite Guarnizo is Pontejos point, and the channel between is 100 yards wide. Lazareto island is about 1 mile to the northward, and near it is the quarantine anchorage. The coast thence trends NE. and NW. to Acebo point, a little more than 1 mile NE. by E. from Lazareto island, and at about one-fourth of a mile WNW. of the point is the islet of Mornay; the bay between these islands is choked by the sands. From Acebo to Pedreña point, $1\frac{1}{2}$ miles farther NE. $\frac{1}{2}$ N., there is a low extent of coast, called Ruballo, and a wooded hill E. of Pedreña point, Alto de Ruballo, or Castrajon, forms one of the marks in entering. The sands between Mornay islet and Pedreña point extend for $1\frac{1}{2}$ miles to northwestward from the islet, and border the main channel, taking at this point the name of Bergantin bank. Cubas river, sometimes called Miera, is a sluggish stream in the dry season, but in the wet season freshets come down that seriously affect the contour of the banks. The mouth of its channel through the sands opens almost S. of Promontory point, and the current is often a dangerous obstacle to a vessel endeavoring to tack in its vicinity. Santa Marina island, the N. point of which is the E. point of entrance to the inlet, is nearly $2\frac{1}{4}$ miles NE. by E. from Pedreña point, where there is a landing-place. The island is low and covered with brush; it is 800 yards long N. and S., and is joined to the main-land by the sands. Between the island and point the Cubas river disembogues, and northward of the river the extensive sands of Puntal extend nearly E. and W., and limit the channel and port of Santander on the south.

South coast.

Quebrantas bank, sometimes called Puntal de Latas, is a dangerous shoal with 1 to 3 fathoms water on it, stretching northward 800 yards from the middle of the sands of Puntal, in the direction of Mouro islet; between this islet and the point off the bank there is a channel half a mile wide, carrying $3\frac{1}{2}$ to 7 fathoms. The extremity of this shoal lies with the castle of San Martin on with Horadada islet, and the hill of cape Mayor on with the W. point of Mouro islet.

Quebrantas bank.

The peak of Cavada, called Cudio by the pilots, is a conical hill 830 feet high, and rises S. $\frac{1}{4}$ E. from Mouro islet, $5\frac{1}{3}$ miles distant. It is easily known by its peculiar form and the dark color of the woods that cover it, and when in line

Cavada peak.

with the Alto de Ruballo is a mark for crossing the bar. (View 46.)

Mount Cabarga. Mount Cabarga, ranging E. and W., a short distance westward of the above, is 1,970 feet in height, and is another mark for the port of Santander. (View 46.)

Lights: Lat. $43^{\circ} 29' 30''$ N.; long. $3^{\circ} 47' 36''$ W. On the summit of cape Mayor there is a circular white light-tower 101 feet high, which displays, at an elevation of 298 feet above high water, a *white* light *revolving every minute*, and visible 20 miles in clear weather. The eclipses are not total within 8 miles. A blue flag hoisted on the light-house by day, indicates that the steam tug cannot put to sea.

Lat. $43^{\circ} 28' 24''$ N.; long. $3^{\circ} 45' 26''$ W. At 14 yards from the N. shore of Mouro islet a conical tower painted white, with red balcony, rises from the center of the keeper's dwelling. The tower is 61 feet high and displays, at an elevation of 136 feet above high water, a *fixed white* light, visible 12 miles in clear weather.

Lat. $43^{\circ} 28' 13''$ N.; long. $3^{\circ} 46' 10''$ W. On point Puerto, 110 yards from Cerda castle, there is a square brick tower 45 feet high and attached to the keeper's dwelling, from which is exhibited, at an elevation of 79 feet above the sea, a *fixed green* light with *white* sector, visible 4 miles in clear weather. The sector of 5° of *white* light covers Horadada islet.

Lat. $43^{\circ} 27' 52''$ N.; long. $3^{\circ} 48' 31''$ W. On the SW. angle of the office of the captain of the port, at the end of Calderon mole, there is a rectangular tower of a dark-straw color, with brass lantern, from which there is displayed a *fixed red* light, visible 3 miles in clear weather. The light is at an elevation of 18 feet above the land, and $29\frac{1}{2}$ feet above the level of the sea, and is visible through an arc of $153^{\circ} 30'$, from point San Martin (which bears E. from the light) around by the S., embracing all the bay with the exception of that portion obscured by the castle and point of San Martin.

Signal-station. The signal-station on Ano point is on the site of the castle of Ano and communicates with vessels by means of the international code. The apparatus consists of a mast and yard, and near it is placed the keeper's dwelling, which is painted in black and white horizontal bands. In connection with the signal-station is a telegraph-office, whence dispatches may be sent to any part of the peninsula. The tariff of messages between vessels and the station is 2 *pesetas*

for the first twenty words, and 1 *peseta* for each additional ten words or fraction thereof. A further charge is made for the transmission of messages by the electric telegraph.

It is high water, full and change, at the bar of Santander at 3^h; springs rise 12 feet, and neaps 8 feet, and, as in all the other ports of the N. coast of Spain, NW. and SW. gales produce an increase in the rise of 1 or 2 feet, and contrary winds a corresponding decrease. The ebb-stream runs stronger than the flood, and has a velocity of 3 to 5 miles an hour at springs; at the mouth of the harbor a branch of it turns to the SE., toward the bay S. of Santa Marina island, and careful account of this should be taken in working out. In the rainy season the strength of the ebb-current is considerably augmented, making the entrance difficult for a vessel without a strong fair wind. The tides and winds constantly affect the banks, so that the older charts are not to be depended upon. Three buoys mark the edge of the banks south of the channel between Mouro islet and San Martin point, and three red buoys mark the western limit of Bergantin bank abreast the town. Tides.

There are also three mooring-buoys at the different anchorages, and several beacons mark the banks after the town is passed. The dredging of the port recommenced in 1873, so even the latest chart may be incorrect in regard to shoal spots in the channel.

The pilots are a well-organized staff, well up to their work; in fine weather they board vessels off cape Mayor, but in bad weather wait under the lee of Puerto point, and guide the vessel through the entrance channel by the usual signals with a flag. A steam-tug goes out to tow a ship in or to render assistance when signaled for; if she cannot go out, a blue flag is hoisted at the cape Mayor light-house. Pilotage is obligatory on vessels of more than 50 tons. An illegal charge of 20 reals, as gratuity to pilot's boat and crew for assistance, is often made, and another of 4 reals as signalman's fee. Other overcharges are frequently made for custom-house forms, &c., and masters of vessels are recommended to show their accounts to their consul to avoid being put to unnecessary expense. Pilots.

Vessels under quarantine pay one-fourth real per register ton per day. This, on a vessel of 800 tons, is \$10 a day. Quarantine.

Vessels having to perform a quarantine of "observation" can do so here.

Marks.

In approaching from the westward, the position of Santander will be recognized by the long reddish-white sands of Liencres or Val-de-Arena on the western slope of Liencres hill, rising 7 miles westward of the entrance, Conejos or Suances island, and Ballota point; and from the eastward by the sharp contours of mount Santoña and capes Quejo, Ajo, and Quintres. (View 47.) The high lands of the interior are not good marks, as the mountains are much alike in appearance, and are often hidden by mist and clouds. On a nearer approach cape Mayor will be recognized, as it is higher than the other headlands and has a light-house on its summit. Mouro island with its light-house will then be seen, with the sands of Puntal and the conical peak of Cavada; the town cannot be seen from seaward.

Directions

It is of the utmost importance for a vessel from the westward, with a fresh breeze from that quarter, to close the coast and make out the land, so as to be certain of her position. With any sea, if near the coast, the San Pedro del Mar (page 99) should be avoided. During southerly winds the coast is clear, but with those from SW. or NW., when blowing hard, it is generally obscured. With the wind from the eastward, between NNE. and SE., a vessel may pass on either side of Mouro island, but large vessels from the westward, with wind from NNW. to NE., should enter by the western channel, called the bar, at half-flood. With N. and W. winds high breakers prevent the entrance E. of Mouro island, and the western channel is then dangerous for sailing-vessels, and, as the channel turns sharply to the W. at Puerto point, skill and great care are necessary.

As the banks shift considerably, the following directions for entering must not be too implicitly relied upon: To enter by the western channel, steer in with Cavada peak in line with the middle of Ruballo hill (View 46) until Puerto point is passed and Horadada islet is in one with Promontorio point; then steer for Peña Castillo, passing Horadada islet at about 100 yards, and, when the light on Calderon quay is sighted open of point San Martin, steer for it; pass the point at the distance of about 100 yards, if bound for the town, and follow the channel (or head WSW. until mid-

way between San Martin point and the little port, and then WNW.) to the anchorage within the office of the captain of the port. Vessels may anchor southward of Promontorio point, or, if necessary, in any part of the channel westward of Puerto point. The usual man-of-war anchorage is in $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water, southwestward of San Martin point, with Cerda castle in one with the N. point of Santa Marina island. Vessels should moor as before directed.

Should the wind be from the westward and the tide flood, when the Peña Castillo is well open of Horadada islet, a vessel may back and fill up to the anchorage with her head to the northward, bearing in mind that two-thirds of the way across the channel the tide sets to SW. With an ebb-tide a sailing-vessel had better anchor off Sardinero beach. In a NW. gale it is imprudent for a large vessel to run for Santander if she can keep the sea. It is better to remain outside and to windward of the port, bearing in mind that the easterly current sometimes attains the rate of 3 miles an hour. A vessel unable to keep the sea may try the anchorage off Sardinero beach, attempt the entrance to Santander, or run for the port of Santoña. The Sardinero anchorage is not good with winds N. of NW. With a more northerly wind a heavy swell rolls in, and vessels already anchored here often have to slip and get under way to avoid parting their cables; as, during a heavy NW. sea, it breaks on the bar, the latter cannot be taken until 4 or 5 hours flood, and then with a fresh and fair wind.

Vessels generally leave the port with the land-wind in the morning, even with a flood-tide, but a vessel may leave with a foul wind and ebb-tide by backing and filling. To insure getting well out, it is well to drop down previously to one of the outer anchorages. The pilot and assistance fees are the same in leaving as in entering the port.

Near Santa Marina island commences the coast of Langre, rather high, level, and steep to seaward, trending eastward and terminating at point Langre. The little beach of Ser-
rera lies between the island and the point, and the village of Langres stands a little back from the coast.

Langre point.

From Langres point the coast trends NE. to cape Galizano, cliffy and steep to seaward. The cape rises in terraces in-
land to the remarkable sharp peak of Galizano, which is E.

Coast.

$\frac{3}{4}$ S. from the light-house on cape Mayor, distant $4\frac{1}{2}$ miles. Beyond the cape is the clean, smooth beach of the same name, very similar to Sardinero beach. Fishing-craft anchor off it during SW. winds. The Galizano river empties at the eastern end of the beach, and its bar is only practicable for small craft at high water. The town of the same name stands on the river-bank. Eastward of the river the coast is low and rocky along the shore, but mountainous in the interior. It increases in height to cape Quintres, which is high and level, and rises vertically from the water's edge. (View 47.) From cape Quintres the coast still trends northeastward to cape Ajo, sometimes called cape Cuberris, about 2 miles distant. The coast of the bay between is bold, and near the middle of it a small stream empties. This cape is the northernmost projection of the Cantabrian coast between Rivadesella and the French boundary. Seen from E. or W. it rises in steps from the sea, and is like cape Quejo, and lower than Quintres. It is $7\frac{1}{2}$ miles E. by N., nearly, from cape Mayor light, and is clean and steep-to.

The little river Ajo empties through a small beach eastward of the cape, and can only be entered at high water by small craft that go as high as the village of Ajo; this village is on a plain southward of the cape and a little inland, and has a population of about 700.

From cape Ajo the coast bends to southeastward and then to ENE. to the rugged, reddish-colored cape of Quejo, E. by S. from the former, distant 3 short miles. In the middle of the bay between is a little beach, the rest of the coast being low, rocky, and barren. The level and prominent appearance of the three capes, as seen from E. or W., is shown in views 47 and 50. Eastward of cape Quejo a low, rocky coast, broken by patches of foul beach, extends to Garfanta point; some isolated rocks lie near the shore, the largest, Isla, forming a shelter for fishing-craft in westerly winds; at high water there is a boat-channel between it and the shore, and on the rock there is a hermitage. The village of Isla is near the shore and SSE. of the cape, in the midst of trees and cultivated fields, and on the bank of a stream navigable for large boats at high water. Population about 650.

Garfanta point, commonly called Mesa de Noja, is $1\frac{1}{2}$ miles from cape Quejo, and 3 miles NW., nearly, from Aguila point, Santoña mountain; it is level, rugged, and barren, projects to NE., and terminates in sunken rocks and reefs that extend some distance off it and should be given a good berth.

Garfanta point is the western limit of Noja bay that extends eastward 2 miles, to Brusco point; its shore is low, rocky, and foul, with a flat beach scattered with rocks, the latter appearing at low water above the sand. Other rocks skirt the shore extending off half a mile, some uncovering and others having 1 to 3 fathoms over them at low water, and outside them the water is shoal. The farthest out are the Hermanas or Liebres, three rocks forming a triangle 75 to 100 yards apart, that show at low tide. When there is any sea breakers extend to a considerable distance from the shore; hence the bay should be carefully avoided. The church of the town of Noja is conspicuous from seaward. The town is S. of Garfanta point in the middle of a plain, and not far from the shore. Population about 700.

Noja bay.

The dark, wooded mountain of Brusco rises at the southern end of Noja bay, and terminates at the sea in the point of the same name. The point is rocky and foul, and near it terminate the reefs that skirt Noja bay. (View 50.)

Between Brusco point and mount Santoña is a low, flat, sandy plain or isthmus, called the Berria sands. The beach is clean, but near Brusco point a few rocks uncover at low water. A road over the plain gives the inhabitants of Santoña a means of communication with the main-land.

Berria sands.

Doble bank, called by the fishermen of Santoña Ganzanilla, is dangerous in a heavy sea, and lies $2\frac{1}{2}$ miles N. of the sands of Berria; it has 10 to 12 fathoms water on it, 16 to 18 fathoms around it, 15 to $16\frac{1}{2}$ fathoms between it and the shore, and 30 fathoms at 100 yards N. of it. From the least water on the bank the battery of Cueva bears S. $\frac{3}{8}$ E.; Pescador point SSE. $\frac{3}{8}$ E.; cape Machichaco E. $\frac{1}{2}$ S.; and cape Quejo W. $\frac{1}{4}$ N. This brings mount Ano open W. of mount Brusco, and cape Ajo open a little of cape Quejo. Vessels bound to Santoña in a NW. gale should be careful to avoid this bank, as there is not only a heavy sea in its vicinity, but, at times, it breaks.

Doble bank.

Santoña mountain.

Mount Santoña is irregular in outline, $5\frac{1}{4}$ miles in circumference, and 1,340 feet high. It is of calcareous rock, broken toward the sea and covered with fertile soil that produces trees, vines, and some vegetables and grain. It has several peaks, of which Lucero is the highest. Eanzo or Escalera peak is the next in height, and then Nespral or Nisperal, conical, 943 feet high, with a circular atalaya or lookout tower on its summit. (View 49.)

From any distance the mountain appears to be an island, and in reality it is so as the heavy seas break through the dike which joins it to the main, and the waters unite with those of the lagoons that surround Santoña. Santoña mountain is well fortified and almost impregnable, the old sailing directions comparing it favorably with Gibraltar, but the fortifications as a rule command only the land side and the road over Berria sands. The town of Santoña is at the foot of the mountain on the western side; and the village of Dueso is on the NW. slope, with fortifications W. of it that command the land. Cueva battery is farther N., and a little way only from Aguila or Atalaya point, the NW. point of the mountain. This point rises vertically, and has a battery of the same name on its summit. Pescador point, three-fourths of a mile ESE. from Atalaya point, is lower than the latter, and is salient to NE.; both are steep-to and may be boldly approached, and on Pescador point there is a light-house. The coast of the mountain thence trends SE. four-fifths of a mile, to Caballo point, rather low, salient and rocky, which has also a light-house on its summit. In rear of the point are high cliffs, and at the highest point of the rocks is the battery of San Felipe. At two fifths of a mile S. of Caballo is Fraile point, a vertical rock about 140 feet high, and partially detached from the mountain; a rock that uncovers at low water lies close to the shore SW. of the point, and a larger rock is seen a little farther in the same direction. At about 100 yards NE. $\frac{1}{2}$ N. from the most projecting part of Fraile point is the bank of Merana, a circular rock awash at low water, so that the sea breaks on it with any swell; between it and the shore there are $2\frac{1}{2}$ to $3\frac{1}{2}$ fathoms, and close outside of it $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms water, sand. On the older charts this rock is shown too far out.

From Fraile point the coast trends SW. to Peon point, and then to San Carlos point, a distance of nearly three-fourths of a mile. From Redonda rock a beach commences that borders the foot of the mountain as far as the port, and between Peon and San Carlos points a bank is formed that extends some 400 yards to SE. with 5 to 9 feet water on it. On San Carlos point is a fort mounting two tiers of guns. Thence the coast trends W. to Galvanes point, with a battery on its summit, and WNW. to the point and fortress of San Martin. A little farther on is point Cruz, where the coast line turns abruptly to the N., and is lost in the marshes that border the town.

On Pescador point of mount Santoña there is a conical white tower with green lantern, rising from the keeper's dwelling, and 30 yards from the sea, from which is displayed, at an elevation of 126 feet above sea-level, a *fixed white* light with a *flash every 3 minutes*, visible 17 miles in clear weather. The tower is 44 feet high.

Lights: Lat. $43^{\circ} 28' 36''$ N.; long. $3^{\circ} 28' 02''$ W.

On Caballo point, the E. extreme of mount Santoña, there is a conical stone tower, painted blue, with octagonal, green lantern, that exhibits, at an elevation of 85 feet, a *fixed red* light, visible 10 miles in clear weather. The tower is 24 feet high. The light is obscured from seaward when bearing eastward of S. $\frac{1}{2}$ E., and is visible from that bearing around by W. to N.

Lat. $43^{\circ} 28' 12''$ N.; long. $3^{\circ} 27' 11''$ W.

The entrance to Santoña inlet lies between the southern shore of mount Santoña and the adjacent beach on the N., and the beach of Puntal del Pasage and the bank of Pitorro, which extends from the sands of Laredo, on the south. The inlet is divided into various channels, the principal and most navigable being that of Colindres on the S., after passing Puntal point. It runs S. for more than 4 miles, and terminates near the village of Rada, the stream of this name emptying into it; it is navigable almost throughout for vessels of moderate draught, the soundings opposite Colindres, about $2\frac{1}{4}$ miles up, being 8 to 14 feet at low water, but at the entrance to Cicero channel there is a rocky bank with only 4 feet water on it. At $2\frac{1}{2}$ miles within the mouth of the Colindres, is that of the Limpias channel, which runs in nearly a mile to the E., to the village of the same name, and then turning to the S. to the villages of Marron and

Santoña inlet.

Ampuero, where it terminates and receives the waters of the Marron river, an unimportant stream, but one whose freshets during the rainy season are very heavy.

Limpías.

The most important town in Santoña inlet, on account of its communication with Castile, is that of Limpías, numbering about 1,400 inhabitants; vessels of 11 to 13 feet draught load here with grain and flour; those above 13 feet draught complete their cargoes lower down, abreast the tower of Treto. The town has manufactories of iron and leather, and has considerable trade.

Santoña.

Santoña, an entirely military town, stands on a sandy plain at the foot of mount Santoña, with marshes to the northward of it and creeks to the westward. It has no internal resources and its communication with the main is by the road over the sands of Berria. It is surrounded by trees and gardens, but has neither commerce nor industry. Population about 1,800.

Port.

The port of Santoña is good and well sheltered, being open only to the E.; the best anchorage is in 6 to $7\frac{1}{2}$ fathoms water, sand, off the battery of Isabel II, which is on the beach S. of the town, partly covered with trees, and NNW. of Puntal del Pasage point. The channel is here one-quarter of a mile across and carries $3\frac{1}{2}$ to $4\frac{1}{2}$ fathoms, which depth continues well within the Ano channel westward. This latter channel is another branch of the inlet, which, leaving the Colindres on the S., continues W. by S. to the towns of Bárcena and Escalante, but with little depth at low water.

Mount Ano.

Mount Ano, 583 feet high, is of conical form resembling the peak of Cavada, of Santander, and is covered with thick woods. It is on the northern bank of the channel of the same name, and isolated by a small channel or dike that surrounds it. The convent of San Francisco de Ano stands on a mound at the foot of the mountain and on its SE. side. The summit of mount Ano is WSW. $\frac{3}{4}$ W. from the battery of Isabel II, distant $1\frac{4}{5}$ miles, and both mountain and convent are marks in entering the port. (View 48.)

Puntal del Pasage point.

The point of Puntal del Pasage is the northern extremity of the extensive sands of Laredo, that terminate at the town of this name $2\frac{1}{2}$ miles SE. of the battery of Isabel II. The point is salient to the N., and on it may still be seen the

remains of Puntal castle, one of the marks in entering, but which it is rather difficult to make out at first.

Pitorro bank extends from Puntal point in a SE. direction for more than 1 mile, when its edge trends to the southward. At low water there are 3 to 6 feet on the shoalest part of the bank, increasing gradually to 9 and 11 feet on its outer part. This bank and that of San Carlos at the foot of mount Santoña form the entrance to the inlet.

The bar, or least navigable part of the entrance, lies between the eastern end of Pitorro bank and Peon point; it is here about half a mile across, narrowing to 300 yards at Galvanés point. The least water on the bar at low-water springs is 10 to 17 feet up to Peon point, and then 10 and 11 to the eastern part of Pitorro bank. Farther in the depth increases to 3 and 6 fathoms to the anchorage. The bar is of sand, and only off the points of San Carlos, Galvanés, and San Martín there are some rocks. The banks, however, are shifting, and little confidence should be placed in the accounts of width and depth of channel, or in the charts.

It is high water, full and change, in Santoña inlet at 3^h; springs rise 11 to 12 feet. The ebb is always much stronger than the flood, running about 3 miles an hour at springs, which much facilitates leaving the port with easterly or NE. winds. When much rain falls the river Marrón has heavy freshets, the ebb acquires considerable strength, and the current of Colindres channel disturbs the beach of Santoña; under these circumstances vessels should anchor far enough in to clear the mouth of the Colindres. In winter, it is well to lie near the Ano channel.

The ebb stream on leaving the inlet sets SE. over Pitorro bank into Laredo bay. Vessels becalmed are in danger of being set on Rastrillar point, unless precautionary measures are used. The flood stream in entering follows the coast of Santoña mountain, sets strong on Puntal point, and into the Colindres channel.

Vessels obliged to work in should always take a pilot, as no turning marks can be given on account of the shifting contours of the banks; and pilotage is obligatory on vessels of more than 50 tons. Pilot charges are the same as those at Santander. Pilots go out to meet vessels approaching.

Vessels bound to Limpias, anchor off Santoña, to deliver the papers; the pilotage from here to Limpias is 90 reals for a vessel of 50 to 150 tons, and 120 reals for one of greater tounage.

Directions.

The inlet of Santoña being open to the E. cannot, be entered during NW. winds, which are the most stormy on this part of the coast, and blow down over the mount in heavy squalls, for which sailing-vessels should be prepared. The most favorable winds for entering are from NNE. to SW. through E. With other winds that are moderate a vessel can work in, or back and fill with the flood. With NW. winds a vessel may run down under sail as far as Fraile point, but will then have to tow or steam, as the wind draws ahead. With a N. wind a vessel may reach Peon point, but the wind here draws out, making it impossible to enter under sail. A steamer may, however, enter by attending to the directions given below. There is anchorage southward of Fraile point in 2 to 5 fathoms water, sand, whence with steam or a tug a vessel can get into the inlet.

To enter the port with a fair wind bring the castle of San Carlos—the southernmost fortification on a high cliff at the foot of mount Santoña—just open of mount Ano, until Fraile point comes on with Caballo point, nearly N. of it, then steer SW. until the convent of San Francisco de Ano is in line with the ruins of the castle of Puntal del Pasage—the remains of a wall that will be seen between the small downs at the termination of the point and the seaweed that partly covers it—and thence steer for the battery of Isabel II, and anchor off it in 6 or 7 fathoms water, at about 300 yards from the beach of Santoña. In a large vessel with a scant or foul wind a pilot should always be taken, as the edges of the banks change and the channel is only known to those frequenting it. Vessels moor NE. and SW. The bottom between fort Isabel II and Cruz point is stiff clay, good holding-ground. The worst winds are from S. to W., which blow strong, and with a gale from this quarter another anchor should be let go, veering to a good scope to avoid being drifted on to the beach or out of the inlet, accidents that are not infrequent. A south wind blowing down Colindres channel causes much sea, and, on this ac-

Nº 43

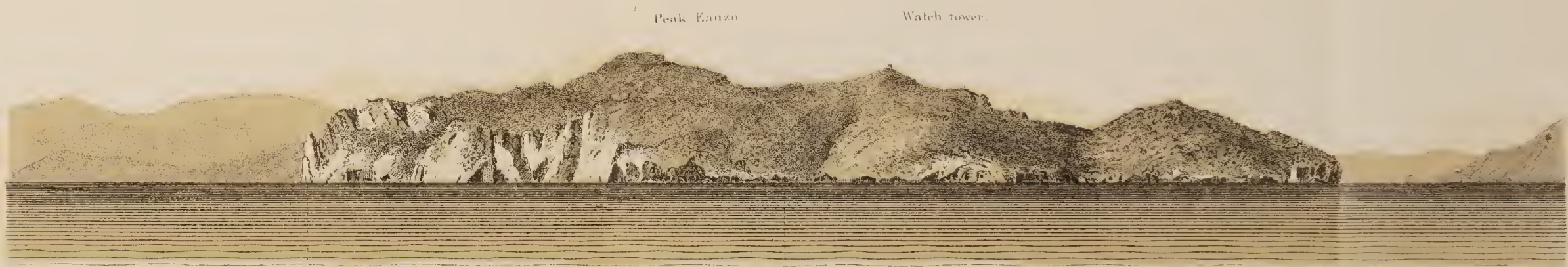


Sancti Anthoni

Sancti Anthoni

Bay entering S 82° W. Dist 1/4 of a mile

Nº 49.



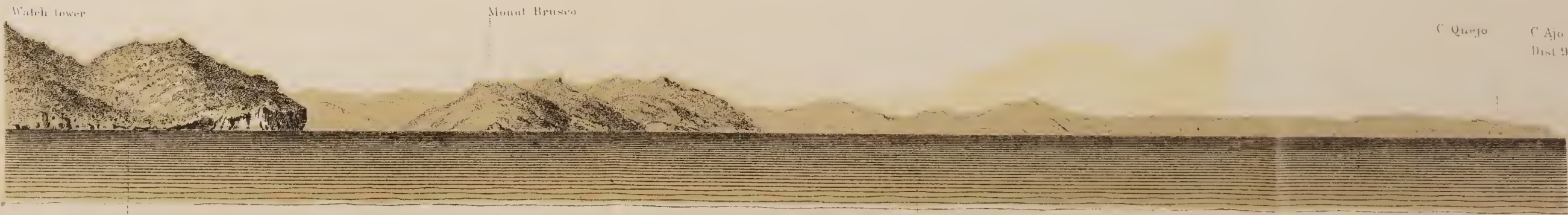
Peak Enzo

Watch tower.

Pt Fraile S. 16° W. Dist 2 1/2 miles

Mount Santoñ

Nº 50



Watch tower

Mount Brusco

C Quejo

C Ajo N 83° W
Dist 9 1/2 miles

Mount Santoñ

count, vessels should anchor during the winter season nearer Ano channel.

Vessels bound to Bilbao, or that find a foul wind for entering Santoña, sometimes anchor between Caballo and Fraile points, where there is good holding-ground and where they are in a better position for getting under way than to the southward of the latter. This anchorage is also taken to ride out a NW. gale, being sheltered from NW. to SW., but vessels ride uneasy if there is much swell. Caballo point may be passed at 400 yards distance and anchorage taken at about one-fourth of a mile NE. of Fraile point, in 7 to 9 fathoms at low water, sand. A good berth is with Fraile point bearing SW. $\frac{3}{4}$ W. and Caballo point NNW. $\frac{3}{4}$ W., about 400 yards from Merana bank which is near the shore. Vessels lie at single anchor and in readiness to slip to make for the inlet or stand to the eastward should the wind suddenly shift to NE. Fraile and Caballo points are easily recognized and are described above.

The principal mark for the inlet of Santoña is the mountain of the same name. (Views 49 and 50.) It is easily recognized, and the only mountain of similar appearance is that of Candina, near the sea-shore, SE. by E. from the former, but Candina has fewer peaks and no lookout tower. Mount Brusco (view 50) is another mark for Santoña. As mount Santoña is approached from the westward the fort of Maza, at an elevation of about 500 feet, Cueva battery and guard-house, and the village of Dueso will be seen.

From a long distance seaward the mountain of Nuestra Señora de las Nieves, with a chapel on its summit, can be made out. It has an altitude of 2,516 feet, and when bearing SSE. $\frac{5}{8}$ E., is in line with mount Santoña. From the eastward mount Santoña appears somewhat open and isolated.

The sand of Laredo, locally called Salvé, extends south-eastward from the entrance channel of Santoña, and forms a bay terminating at the cliff of Laredo, a small promontory with a bight on either side, $2\frac{1}{4}$ miles SE. by E. from fort Isabel II. The western bight forms the little port of Laredo, and the village of the same name is built along the

shore. The port is now so choked by the sands that the fishing-craft haul up on the beach for shelter. The town was formerly of considerable importance and the port good. It has about 3,200 inhabitants, chiefly engaged in the fisheries, and is surrounded by a wall.

The NE. point of the promontory is named Rastrillar, and has a battery of the same name on its summit. The Rastrillar rocks extend northward and westward from the foot of the cliff. From this point the coast trends E. 2 short miles to a high, steep, rugged headland, named Ahorcado, on the eastern side of which is the little bay of Yesera, so called from the deposits of gypsum (yeso) in its vicinity. A few coasters come here in the fine season to load with this product.

Mount
dina.

Can- At 1 mile E. of Ahorcado, mount Candina rises from the coast to an altitude of 1,390 feet, and is remarkable for the white patches conspicuous in the midst of the dark, wooded land. The mountain is of calcareous rock that shows here and there, and terminates in peaks that are less prominent than those of mount Santoña; it is a good mark from seaward.

Between Yesera bay and mount Candina there is an islet close to the shore with a boat-channel inside it, and several rocks lie close along the shore between the Ahorcado and the cliff of Laredo.

Oriñon point.

A low, narrow tongue of land, extending NE. for half a mile from the foot of Candina mountain, is known as Oriñon or Sonabia point. A ridge rises from the middle of it, and it is connected to the main by a low, narrow neck, partly covered at high water, and entirely covered when there is a high sea. S. of this point is point Islares, with the village of the same name near it. The point is low, slightly salient, and has a few rocks off it, and it forms the eastern limit of Oriñon bay, the sands of which extend to mount Candina, and some way up its eastern slope.

Oriñon inlet.

Near the western extremity of this beach is the mouth of Oriñon inlet, which extends S. to the valley of Guriezo, and receives the waters of the river Aguera. The inlet is frequented by coasters and small craft that bring iron-ore to the founderies in the vicinity. The inlet winds along the eastern side of mount Candina; it has a shifting bar, and

the entrance is only practicable at high water and in fine weather, as the bar is nearly dry at low water. The village of Oriñon, with about 200 inhabitants, is on a sandy plain on the western shore of the inlet, and on the opposite shore is the village of Islares, of a little more importance.

The inlet of Oriñon may be recognized from a long distance seaward by the large ravine the land forms between mounts Candina and Cerredo. The white sand of Oriñon can also be seen a considerable distance, and the point of this name appears like an island against it. From Oriñon inlet rises the western end, rugged and broken, of mount Cerredo, that extends eastward to the town of Castro Urdiales. Its northern side falls in a gentle slope to the sea, where it terminates in low land that shows large patches of slate-rock. Toward the western side of the mountain, and in the vicinity of Islares, is the peak of Cerredo, 1,813 feet above the level of the sea, and on it there is a landmark. (View 51.) This peak is a good mark for Santoña inlet and the port of Castro Urdiales. Mount Cerredo.

A similar high mountain, only visible at a distance seaward, is $5\frac{1}{2}$ miles inland, SW. of Cerredo and S. of Candina mountain. There is a conspicuous hummock on its summit, named Castro, crowned by the chapel of Nuestra Señora de las Nieves, before referred to. This is the highest mountain of the valley of Guriezo, and is also a mark for Santoña inlet, and much used by the fishermen.

From Islares point the coast runs eastward—low, even, and with slight bends; slaty, and showing whitish patches—to La Lastra point, 3 miles ESE. $\frac{1}{4}$ E. from Oriñon point. La Lastra point, though higher than the coast just described, is difficult to make out from a distance, but, on nearing it, two watch-houses will be seen a little back from the cliffs and on its highest part. Between Islares and La Lastra points is the low, blackish rock of Cerdigo, close off the point of the same name. It is united to the coast by a short reef that uncovers at low water. In a strong breeze the sea washes over the islets. At about one-third of a mile ESE. $\frac{1}{4}$ E. from La Lastra point is point Rabanal—lower, rocky, and slightly salient. A dangerous reef sets out from it with 7 fathoms water on it at 400 yards off shore. Farther out the soundings are irregular over a rocky bottom, Coast.

and there is one head, the Cabrera, with 16 fathoms on it where the sea breaks when there is a heavy swell. A berth of more than a mile should be given Rabanal point in making the port of Castro Urdiales, if there is much sea from the NW. At night the Galea light should be steered for until Castro Urdiales light bears S., before heading for the port.

Castro Urdiales
bay.

Rabanal point is the northern limit of Castro Urdiales bay, which is completely open to NE., and has only 3 to 4½ fathoms water in it at low tide. The bottom is rocky, and the bay only convenient for vessels of light draught. At a little more than half a mile SSE. ¼ E. from Rabanal point is the Atalaya of Castro Urdiales, a vertical cliff, 66 feet high, with several rocks and an islet close to its NW. side. At 100 yards SE. from the Atalaya is another and higher cliff, on which is the old castle of Santa Ana, with four circular towers, and on the SE. tower is the light. The castle is white toward the sea, and visible at a great distance. At 100 yards SE. from the castle is the Peña de Santa Ana, another rock, 63 feet high, vertical on all sides except the W., where there is some slope. On its summit is the chapel of Santa Ana. Between this rock and the castle are two others, one larger than the other, and the three are connected by bridges to communicate with the chapel. Walls have been raised uniting these rocks and sufficiently high above the level of high water to impede the entrance of the tide and protect the bay of Castro Urdiales. If the bay had deeper water and were a little larger it would be an excellent port of refuge for winds from SE. to N. through W.; but it can only be used by small craft and vessels of 9 to 11 feet draught waiting for a tide or favorable weather to take the bar of Bilbao. Southerly winds acquire a terrific force, and good ground-tackle is a necessity.

Port.

The port is formed by two moles, with the mouth, 45 feet wide, open to the southward. With a NW. or N. sea a heavy swell runs into it, causing much damage to the small craft inside. The bottom is rock with a light layer of sand and mud, and at low tide almost all the port dries except near the entrance, where there are 5 to 9 feet water. It is large enough to accommodate the 130 fishing-boats owned

in the vicinity, with 15 to 20 coasters, which are secured in tiers.

The town of Castro Urdiales is surrounded by walls; it faces the port and extends N. and S., so that seen from the E. it presents a pleasing and imposing appearance. There are manufactures of linen fabrics, sails, ropes, fishing-gear, tiles, bricks, &c., but a great portion of the inhabitants are employed in fishing. There is but little trade, consisting chiefly of iron, wine, brandy, salt fish, and hides. Population about 3,200. The town is seen from a great distance, particularly the church, which stands on elevated ground a little W. of the castle and light. The many rocks that surround the bay are perfectly detached from the main-land.

On the SE. tower of Santa Ana castle there is a circular, white light-tower, from which is displayed, at an elevation of 148 feet above the sea, a *fixed red* light varied by a *flash every 3 minutes*, and visible 7 miles in clear weather. (View 51.)

Light: Lat. $43^{\circ} 24' 20''$ N.; long. $3^{\circ} 16' 06''$ W.

It is high water, full and change, in Castro Urdiales bay at 3^h; springs rise 11 to 12 feet.

At about half a mile SE. by S. from the Peña de Santa Ana is the low, rocky point of Cotelino, which limits Castro Urdiales bay to the SE. To enter the bay from the westward with winds from that quarter, give a good berth to Rabanal point, according to the state of the sea, and continue on for the castle and cliffs of Santa Ana, which may be closed to a distance of 50 or 60 yards, as they are steep-to, coming-to to the southward of the chapel with the ends of the moles in one. At night care must be taken to keep well clear of Rabanal point. Only vessels of a draught that can enter the port should frequent the bay, for should the wind come out at N. or NE. there would be great danger of losing the ship. The boats of the port are large and strong, and the boatmen go out in all weathers if assistance is required. For extra anchors, assistance, &c., there is a regular tariff of prices.

The coast between Santoña and Castro Urdiales is mountainous in the interior, and low along the shore; it is generally clear of danger except at Rabanal point. At $8\frac{1}{2}$ miles N. by E. from this point is a small bank, named Castro Verde, with 25 to 30 fathoms water on it, where there is often con-

Town.

Tides.

Directions.

Castro Verde
bank.

siderable sea, and where the sea sometimes breaks with a southerly gale. There are 40 to 45 fathoms water near the bank, deepening rapidly to 60 and 70 fathoms, and in bad weather care must be taken to give it a wide berth, passing either outside or inside of it.

The bank lies with mount Cabarga of Santoña on with the highest part of mount Brusco, and Castro hill, on which is the chapel of Nuestra Señora de las Nieves, in one with a peak—not very prominent—of mount Cerredo, named Verde, westward of the highest peak of the mount. Hence the name, Castro Verde, of the bank.

Point Mioño.

Westward of Cotolino point a considerable beach uncovers at low water, and through it the Brazonar river empties, an unimportant stream. At one-third of a mile SE. of Cotolino is Mioño point, high, steep and clear. Both these points extend from the Cueto de Mioño, a height with an elliptical base that appears cone-shaped when seen from the westward. On the eastern side of Mioño point is a small foul beach and little inlet of the same name. The latter, also called port Dicado, is only accessible for small craft at high water and in favorable weather; it is frequented in summer by light-draught boats that carry iron-ore to Oriñon and other Biscayan ports, and it has a small jetty where the boats load. The village is on the sea-shore within the port: population about 300. At the eastern end of Mioño beach is a high rocky point, named Salta Caballo.

Bilbao bay.

Between La Lastra point and Villano islet, $13\frac{1}{2}$ miles E. by N., the coast forms a large bight 4 miles deep, at the head of which the bay of Bilbao opens and recedes 3 miles to the SE. This bight is dangerous, with on-shore winds, for with much sea it would be very difficult for a vessel to get out of it on either tack, and it would be necessary to run for the bar of Bilbao at all hazards. It is therefore prudent to avoid it unless bound for Bilbao, and at a time when the bar is practicable. All the coast of the bight is dangerous, with strong winds from NE. to W., and there is no port of refuge except Castro Urdiales, with these winds. Southerly winds blow with extreme violence in the bight, and vessels are blown off the coast, being unable to carry sail.

From Salta Caballo point the coast, rather low and rocky along the shore and mountainous in the interior, trends southeastward to the rocky point of Onton, the western limit of the little bay of the same name. This bay, also called Berrion, recedes to the SW., and into it empties the Sabiote or Onton river, that forms the boundary-line between the provinces of Santander and Biscay. Sabiote river.

The province of Biscay, commencing at the Sabiote river, terminates at Santurrarán point, the eastern limit of Ondárroa bay. It has about 50 miles of bold coast without a single harbor for large vessels, with the exception of Bilbao, which may be entered by vessels of 13 to 14 feet draught in fine weather. The small ports are only used by fishing-craft and small coasters, and can only be entered at high water. East of cape Machichaco there is an open bay, where vessels of all classes may anchor in winds from W. to SW., but they are in great danger should there be a sudden shift to the opposite quarter. Province of Biscay.

The NW. winds blow with great force on the coast of Biscay, and bring a heavy sea that prevents any mercantile operations in its small ports; but the coast is, fortunately, clear of outlying dangers and may be approached to a moderate distance, unless there is a great deal of sea on. In the interior the land is generally mountainous and broken, and along the shore it is arid and rocky, with occasional breaks and beaches where the sand has been washed up by the sea, forming the only ports, approachable only in fine weather. From a distance are seen the high crests of the Pyrenean range, the peaks of Gorbea and Amboto attaining an elevation of 5,115 and 4,526 feet respectively. The spurs of the chain descending to the coast form a series of peaks, many of which, seen from NW., appear to be perfect cones.

The NE. and E. winds—N. and NW. in the bight of Bilbao—alternate with NW. and W. winds during the summer, and generally fall in the evening and are succeeded by the land-breeze. Winds.

In autumn the S. winds prevail, and generally blow strong, lasting two or three days, and sometimes eight or nine, with clear weather; but as soon as they haul to SSW. the sky begins to cover with scud and the *vendaval* com-

mences, SW. and W. winds, blowing a gale, with heavy squalls, veering after some days to NW. This wind causes a very heavy sea on the coast and closes all the ports; it lasts for about a fortnight, being interrupted by two or three days of moderate weather; but fortunately the sky clears sufficiently at times to see the coast and verify the ship's position.

The N. and NNE. winds blow directly on shore and obscure the coast by clouds and continual rain and hail; but they are not of long duration, and blow generally between the middle of December and the last of February, or first of March. There have been winters with only two or three hard northers, but in others they are very frequent.

The NE. winds are not frequent in winter, but at times they come with heavy clouds and last two or three days, when they are called *Nordestes pardos*, or dry northeasters. As they go down they veer to the E., and are then preludes to southerly winds.

As soon as the wind veers from NE. through E. to SE., a vessel should close the coast, as the S. wind will soon follow; but when, after two or three days of S. wind it veers to SW., a vessel should stand well out or make a port, for the NW. wind will soon set in. In the spring the winds are more moderate, but almost always from the SW. and NW. quarters, with rain, and some years these continue as late as July.

Sea.

The NW. sea, having a range of the whole distance from the coast of North America, causes the most damage; there is not a bight along the coast that does not feel its effects, and it is only in the interior of the inlets, and at low water, that a vessel is not exposed. Commencing about the middle of September or first of October, it is felt for two-thirds of the year, with short interruptions. It is almost always a prelude of the NW. wind, and sometimes precedes it twenty-four hours. In winter a heavy sea rises during a calm, closing all the ports and inlets, and breaking in 25 to 30 fathoms water. The waves are enormous, and are estimated in one case, by Fitzroy, to be 60 feet in height, and they are, of course, very dangerous for vessels near the coast.

In August, heavy squalls and shifts of wind, called *Galer-
nas*, are experienced off the coast of Biscay. They gather
over the land during the heat of the sun, rise in the SW.,
when the horizon becomes obscure, and as they reach W.
the weather becomes thick. The wind then soon veers to
the NW., whence it comes out suddenly and violently, so
that, unless every precaution is taken to receive it, much
damage may be done. It is accompanied by rain, and lasts
in full force for three or four hours, when it gradually falls
to a moderate NW. breeze, and at nightfall dies away. At
times, particularly in summer, the *galerna* shifts suddenly
from S. to NW., without any warning, and then blows with
much force. It is also common to see these two winds strug-
gling for the mastery, and separated by a belt of calm,
shown by the waves curling on its borders; a vessel in the
calm belt should reduce sail and be ready for the result.

The S. wind is foretold by a remarkable clearness of the
atmosphere, when the most distant peaks of the mountains
of the interior are clearly seen, and the remotest objects ap-
pear as distinct as if they were close at hand. During an
E. wind or a calm, if the peaks are seen so distinctly, and
about the summits a few isolated, grayish clouds, the S. wind
is near at hand. Sailors sometimes are able to foretell these
winds by the clouds of dust rising inland, or the direction
of the smoke of the mountain-fires.

Lightning is frequent at the beginning and termination
of bad weather, and during the formation of the *galernas*.

The barometer rises with winds from W. through N. to
NE., and falls with other winds.

The currents set E. and NE. during the winter, with more
force off shore than close in under the land. On this part
of the coast the navigator should be on his guard. It is not
easy to determine the velocity of the current, but it usually
runs about 3 knots an hour with a W. or NW. gale. In
summer it is slight, and sometimes sets W. or NW.

Vessels not bound to Bilbao, nor the ports of Guipúzcoa,
should keep well off the coast of Biscay; but if bound to
any of these ports should close the coast as much as possi-
ble. As the prevailing winds are from the SW. and NW.
quarters, there is not much danger in keeping well in in
sight of the lights and marks, so as to have a good check

Squalls.

Barometer.

Currents.

Directions.

on the position of the vessel. NW. gales lose much of their force when they strike the coast, and, as already stated, the current is less strong than it is farther out. Many disasters have occurred on the Arcachon banks from vessels not being navigated near the coast. A vessel keeping too far out is exposed to the greatest force of the wind, and the greatest strength of the current, which sets toward the coast of Gasconne, in France. The marks are not seen by day on account of the thick weather and distance from the coast, nor the lights by night; and while the navigator believes himself by his reckoning to be clear of all danger, he is apt to find himself embayed and on a dead lee-shore on the dangerous coast of France, where the only chance of safety for a sailing-vessel is in a shift of wind.

Muzquiz point. From Onton bay a rather low coast, high in the interior, trends E. to Muzquiz point, 2 long miles E. $\frac{3}{4}$ S. from Onton point; this point is low and rocky, and forms the western point of entrance to Somorrostro bay.

Somorrostro bay. The bay of Somorrostro is surrounded by the sand of the same name, which is visible from 15 miles seaward, and extends to the western slope of mount Lucero, and at the western extremity of the sand opens the mouth of the inlet or river of Somorrostro, the bar of which dries at low water. At high springs there are 7 + 8 feet water, so that it can only be entered by small craft, under favorable circumstances, that load with iron-ore. The bar is immediately within point Muzquiz and near an islet connected with the shore by a mole nearly 200 feet long. The hermitage of Nuestra Señora del Socorro is on this islet. The village of Muzquiz and various houses are scattered along the western shore of the inlet, the eastern shore being formed by the sand of Somorrostro. The Colisa river empties into the inlet. The best mark for this inlet is the sand already described; the two Serantes, conical and like peaks, eastward of the inlet, and a little inland, are also used. The nearest to the inlet is the peak of Montañño or Serantes Chico, 1122 feet high, at 2 miles SE. from the entrance. Another good mark is mount Lucero. (View 52.)

Mount Lucero. At the eastern end of the sand of Somorrostro the coast is rocky and broken; the land then rises regularly to mount Lucero or Luzuero, which extends NW. and SE. with a

smooth slope to the sea. When seen from seaward it has the same appearance as the peak of Montaña, and when it is in one with mount Serantes SE. $\frac{5}{8}$ E., the two appear like a single conical peak. Mount Lucero has an altitude of 1,011 feet. Lucero point, at the foot of the mountain, is salient to NW., and eastward of it is a point salient to NE., called Sevallo, or, by the pilots, Agujero point.

At about $2\frac{3}{4}$ miles ENE. $\frac{3}{4}$ E. from Sevallo point is point Galea, the two being the W. and E. points of entrance to Bilbao bay, an inlet running in about 3 miles to the SE. From the funnel shape of the bay, the sea and land breezes alternate day and night during the fine season, but in winter the strong winds from W. to NE. blow directly in and cause a heavy swell that reaches the head of the bay. Both shores are fronted by reefs; these lie close to the western, but extend 200 to 400 yards out from the eastern shore. In bad weather no vessel should enter the bay unless sure of being able to cross the bar.

Ciervana or Siervana point is nearly 1 mile SE. by E. from Sevallo point, and is low, with rocks off it. The coast between these points is the base of mount Lucero, of low cliffs with detached rocks. A break in the coast forms the little cove or port of Ciervana, used by fishing-craft. A few houses and the coast-guard station are on the slope of the mount near the shore, in the valley between mounts Lucero and Serantes. This valley is named Nogales from being covered with trees of that name, (walnuts.) To the NE. of the valley, and in 14 or 15 fathoms water, is the anchorage of Nogales.

Mount Serantes, like mount Lucero, extends NW. and SE., reaches an altitude of 1,502 feet above the sea, and when bearing southeastward, has the conical appearance of the latter mount and forms a good mark for the bay. Its slopes reach the shore of the bay of Bilbao.

Between Ciervana and Santurce, $2\frac{1}{2}$ miles farther in, are three batteries—Xebiles, called Primer Castillo (first castle) by the pilots, about $1\frac{1}{4}$ miles SE. of Ciervana, and where the signals of the bar pilots are repeated; Cuartas battery; and the battery of Campillo. The fishing-village of Santurce, with about 300 inhabitants, has a circular pier harbor, only large enough to accommodate a few of the

larger boats; the bottom is of rock, and it dries at two-thirds ebb. Santurce is the residence of the master pilot, and the bar and river pilots, who are in a good position for boarding vessels. The village has a pleasant appearance, and faces the SE., but it is not seen on entering the bay; thence to the entrance to the river is half a mile.

Point Begoña, low, rocky, and surrounded by reefs, is nearly a mile NE. $\frac{3}{4}$ E. from Santurce; the beaches of Guecho and Algorta lie between, separated by the bar. At 700 yards N. of Begoña, and in the middle of a foul, stony beach, is the town of Algorta, with about 1,500 inhabitants, and with a little port for the fishing-craft similar to the one at Santurce. The town is scattered over the side of a hill, and can be seen a long distance. From Algorta a rocky coast trends NW. to San Ignacio point, whence reefs extend 600 yards to NW. The coast here turns eastward and then NW. again, and is rocky and foul. A rock named Piloto lies about half-way between San Ignacio point and Galea light, and at 400 yards off shore, with 20 feet water inside it at low tide. At low springs the rock uncovers and has the appearance of a buoy. The village of Guecho is on the plain above the cliffs, between the points of San Ignacio and Galea; and Galea castle, where is the light, is on the cliffs half a mile SSW. of the latter point. Galea point, the E. point of entrance to Bilbao bay, is high and steep, with the remains of a battery on its summit and a reef at its foot. Almost all the shore from this point to San Ignacio point, which is red and has a battery on it, is steep, abrupt, and of a whitish color, with a table-land above extending to southeastward.

Bar.

The bar of Bilbao is dangerous, not only from its constant shifting and little depth of water, but because it is exposed to the worst winds of the coast and to the NW. sea; but vessels are often obliged to run for it, regardless of the weather, if there is sufficient water on it for them to cross. The sand-banks between Algorta and Santurce leave only a narrow channel between them, with 2 or 3 feet water at low springs, and both the position and depth vary with every freshet of the Nervion and with every gale, so that the pilots have to sound constantly and carefully. The bar is generally near the western shore, and in the direc-

tion of the river-channel, and carries 14 and 15 feet water at high springs, 13 feet draught being the maximum that should be prudently calculated upon to insure passing the bar at the best tides and in the most favorable weather. During 1871 the average depth on the bar was at high tides $13\frac{1}{2}$ feet, and at neap tides 11 feet. The NW. gales affect it most, and at times close it completely. No vessel drawing more than 8 feet should attempt to enter without a pilot, especially if there is any swell. If there is any sea it breaks on the bar even at high water. The bar is nearly half a mile outside the ends of the moles.

The entrance to the Nervion river, at the head of Bilbao bay, is formed by two sea-walls or piers, about 150 yards apart, the eastern one being continued without a break for $7\frac{1}{2}$ miles to Bilbao, and serving as a tracking path, and the western extending as far, but with several interruptions. There are several muddy flats stretching out from both banks, but otherwise the river is clear, and as there are no great sinuosities, a vessel may reach Bilbao under sail with one wind. The width of the channel varies from 70 to 200 yards, the depth gradually diminishing from the silt and gravel brought down by the Nervion and its tributaries, but between Portugalete and Olaviaga there are 4 to 18 feet at low springs, giving anchorage for any vessels that can cross the bar. The best water is generally near the western mole. A little above Olaviaga a flat of shingle, that dries at low water, extends from the left bank nearly across the river.

Portugalete, on the W. bank of the Nervion, a short half-mile within its mouth, is a town of about 1,200 inhabitants, at the foot of San Roque hill, and its handsome parish church, standing on an eminence, is seen immediately on entering Bilbao bay. The anchorage off the town is the best for large vessels, as the river here is deep, and they can make fast to the guns or stone pillars on the quays. The chief occupation of the inhabitants is in loading and discharging vessels too large to go higher up. Smaller vessels anchor just off the town or make fast to the mole and to the larger ones. In winter the Portugalete anchorage is bad on account of the heavy swell, that sometimes enters, and in such cases vessels often shift their berth to the Sestao

channel that opens just within the town, and traverses the broad bank of mud and sand between the actual coast and the western mole. Small craft lie afloat in it at low water. The village of Sestao, with about 250 inhabitants, is on a height southward of the channel.

River.

The head of the western mole after the break at Portugalete is called Venerita point. At high water the mole is almost awash, so that only the round tower at its head and the mooring-pillars along it can be seen. The breadth of the channel here is about 150 yards and the depth 9 to 14 feet.

At nearly a mile above Venerita point there is a bridge of a single span in the eastern mole, through which the waters of the Udondo river flow. Boats engaged in transporting building-stone, timber, &c., enter at high water. Between this river and the mouth of the Galindo, just around the first bend, there is a dangerous bank on each side of the channel. The edges of the banks are marked by buoys. Mount Aspe, on the eastern shore of this part of the Nervion, is steep, and is the only barren hill near the river, the others being cultivated and scattered with the farmers' dwellings.

Opposite mount Aspe there is a second break in the western mole, giving place to the walls of the grounds of the convent of San Nicolás del Desierto. The convent is in a grove on an eminence near the river bank. The Galindo river empties just south of the convent grounds, and is spanned by a bridge of three arches. Near the bridge there is a large iron-foundry. Coasters and small craft, bringing coal or loading from the foundry, anchor off the convent wall and the mouth of the Galindo.

At two-thirds of a mile above the Galindo are seen the remains of the tower or fort of Lúchana, and on the opposite shore the famous bridge of the same name, with three arches, spanning the Asúa river, navigable for large boats for some distance. Just beyond the bridge the eastern mole takes a sharp turn to the SE. along the foot of a high, barren, and rocky hill, named Cabras. Opposite this angle is the mouth of the Salcedon or Cadágua river, navigable for lighters for two-thirds of a mile, to the chain-bridge near Burceña convent. Immediately after forming the elbow above described, the river turns to SSW. for half a mile, to

the quarantine ground and hospital. Near the latter are a group of houses and a rope-walk, and the prospect from this situation is a very pleasing one. Mount Banderas, about 725 feet high, rises to the eastward of the quarantine ground. On its summit is a fort and a signal-station, where the signals made at Portugalete in regard to ships' movements are repeated.

The village of Olaviaga is a short half-mile beyond the quarantine station. It is a flourishing place of about 1,000 inhabitants, scattered along both banks of the river for more than half a mile. It is the usual place for loading and discharging, and may be reached by any vessel that can cross the bar. All vessels make fast to the western mole, the eastern being kept clear for tracking. Marine stores, fresh provisions, and anything ordinarily needed aboard ship may be had, and communication with Bilbao is easy, either by land or water. Beyond the houses on the southern shore is a dock. Olaviaga.

From Olaviaga the channel narrows, and the river trends eastward, and then southeastward to Bilbao. Vessels of 9 feet draught can proceed to the town at high-water springs, and of 7 feet at neaps; but in all cases they load and discharge on the ground. At the railway quay opposite the town the ground is bad, and no vessel drawing 7 feet can lie alongside.

Bilbao, the capital of the province of Biscay or Vizcaya, stands on a fertile plain on the banks of the river Nervion, 7 miles from its mouth. It is surrounded by hills on all sides except toward the sea, and, viewed from any of these heights, is exceedingly picturesque. It is generally well built, and some of the principal streets are straight and spacious, though most of them are narrow and winding, and all are clean and well paved. The new town on the eastern bank is connected with the old town on the opposite shore by three bridges, one of which is an iron suspension bridge. The supply of water is excellent; it is conveyed in stone tunnels under the street, and, that these may not be disturbed, wheeled vehicles are absolutely prohibited, and traffic is carried on on horseback or by means of sledges. Some of the public buildings are very fine; the slaughter-house, which serves also as a meat-market, is a fine build- Bilbao.

ing, of the Tuscan order, and is kept perfectly clean by a copious fountain, which is constantly flowing. Ship-yards, warehouses, and factories are scattered along the shore of the old town, and there are abundant resources of all kinds. Bilbao is the second commercial city in Spain, and ship-building is carried on to a large extent. In 1871, 1,707 vessels of all nations, with tonnage 270,787, besides 649 coasters, with tonnage 77,906, entered, and nearly an equal number cleared from the port, and the number of steamers was steadily increasing; three lines of railway from the mining districts were in course of construction, and one line was in operation to the interior, crossing the northern railway of Spain. There was great and increasing demand for iron-ore from the Bilbao district from England, France, Belgium, and Germany, and the supply seems inexhaustible, not only the Somorrostro district, but the whole vicinity being full of mineral, more or less rich. The export of iron-ore for 1871 was 354,000 tons, an increase of 84,000 tons over that of 1870. During this year, also, a concession was granted to an English firm to construct a harbor of refuge in the bay of Bilbao in accordance with the plans of the eminent English engineer, Mr. C. B. Vignoles, to consist of two vast breakwaters, one commencing at Santurce, and the other at Algorta, both outside the bar, which would thus be destroyed and a fine harbor formed. Fifteen years were allowed for the execution of the work. Chief manufactures: woolen and linen goods, silks, iron, copper-ware, hats, paper, and soap. Imports: cotton and woolen goods, colonial produce, dried cod, coal, coke, timber, &c. Exports: iron, fruits, oil, grain, flour, ore, wine, madder, licorice, skins, chestnuts, &c. Population, about 21,000.

Tides.

It is high water, full and change, on the bar of the Nervion at 2^h 45^m; springs rise 12 feet and neaps 7 feet. At Olaviaga, at 3^h 15^m, springs rise 12 feet; and at Bilbao, at 3^h 20^m, springs rise 9 feet. With fresh NW. winds the tide rises about 2 feet higher than usual, and the time of high water is half an hour later; while the contrary effect takes place with winds from NE. to S., which should be taken into consideration. The ebb stream runs 3 knots at springs and 1½ at neaps.

At Galea castle there is a circular white tower rising from the center of the keeper's dwelling, from which is displayed, at an elevation of 401 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

Light. Lat. $36^{\circ} 22' 36''$ N.; long. $3^{\circ} 01' 02''$ W.

At the end of the western mole there is a circular pilot tower where a light is shown if the bar is practicable; but should the light appear and disappear several times suddenly, vessels should not approach the bar. A light is also used for signaling at the foot of the tower.

There are about 40 pilots registered between Portugalete, Santurce, and Algorta, who go out without any regular turn, the first to arrive piloting the ship; if the weather is too bad to put out from either of these points and there is a vessel waiting outside the bay, the pilots go overland to Castro Urdiales, and go off in one of the fishing-boats. Pilots will be found in fine weather some distance to the westward of the bay, but rarely to the eastward, as most vessels prefer to make point Lucero when bound in, to be to windward of the bay should a SW. or NW. wind set in. A chief pilot, whose duty is to guide vessels across the bar, is always, weather permitting, in attendance outside the bar, and his boat will be known by a *red* flag, by which he directs the vessel's course, pointing to starboard or port, and holding the flag vertical if going well. The signal directs the vessel's head, not helm. If the weather is too bad to go out, the signal is made from the pilot-tower at the head of the SW. mole, where the signal from the boat is always repeated; it is also repeated at the "first castle," Xebiles battery, outside of Santurce, with a white flag. When there is sufficient water on the bar, the flags at both places are shown, and no vessel should approach the bar without having sight of the flags. Should a vessel approach the bar before there is sufficient water on it, the flag is waved continuously from side to side. At night similar signals are made with lights at the foot of the pilot-tower on the mole, and the vessel entering should carry a top-light. Assistance may be counted on from shore should any trouble arise, and spare anchors, &c., may be obtained from Portugalete. Pilotage is obligatory on vessels of more than 50 tons. A steam-tug may be had for towing over the bar. Signal for tug, ensign at fore-yard arm.

Pilots.

Directions.

The position of the bay of Bilbao is easily recognized, if coming from the eastward by capes Machichaco and Villano, (Views 52 and 53,) and from the westward by mount Santoña, the town of Castro Urdiales and the peaks of Montaña, Lucero, and Serantes. If from the NW. it will be known by the mountain of Amboto, 4,526 feet in height, with its head inclining westward; it is an excellent mark for the bay, and bearing SE. by E., leads in. On nearing the bay the high reddish-white sands of Algorta and Guecho will be seen, the light on the highest part of the cliffs of Galea, the village of Algorta, that of Portugalete with its church, which is seen a long distance, and the circular white pilot-tower on the SW. mole.

With a fresh westerly breeze vessels should wait off Castro Urdiales for the favorable moment to enter the bay, and the time of high water should be exactly known to avoid inconvenience and risk. In fine weather the bay may be entered and anchorage taken off Nogales, or farther in to wait for daylight or tide. As the worst gales are those from SW. to N. through W., a vessel should, particularly in winter, close the coast about Santander or Santoña, to be able to enter these ports in bad weather, or to keep to windward of Bilbao if obliged to heave-to. This gives them, besides, a chance of meeting one of the pilots who rarely fail of being on that part of the coast. The bay should not be entered in bad weather without a pilot, but if embayed at neap-tides with on-shore winds, and unable to get out under a press of sail, the anchorage of Nogales, with good holding-ground, is the best, and the best berth is at half a mile from shore in 14 or 15 fathoms water, sand, with Galea point on with cape Villano; a second anchor should be ready to let go. Should a vessel of light draught get into the bay during a gale with the tide favorable for crossing the bar, attention should be given to the signals; sail should be kept to keep the vessel before the sea, and the head-sheets aft to keep her from broaching-to; also hatches should be battened down, and anything loose on deck lashed, as two or three seas may break over the vessel. In a heavy gale the sea commences to break in a line between Galea point and Siérvana cove.

The bar is taken in all winds except those from SE. to

SSW. which are off shore. Southerly winds predominate in October and November, and are very strong at the entrance of the bay. The wind comes down in squalls and eddies from the high land on the W. coast, and in working for the bar the vessel should keep between the E. coast and the middle of the bay, to avoid the eddies. For large vessels the high tide between 2^h and 5^h p. m. is the best, and they should be at the bar an hour and a half before high water. The bar can be taken even an hour after high water if the vessel can make headway against the current.

A vessel should leave the river before the flood is done, and the best tides are those between 5^h and 7^h a. m., so as to have the land-wind, which scarcely ever fails if it does not blow hard outside. Departure should never be attempted with the ebb-tide, or with a sea on the bar. Southerly winds prevail about the vernal and autumnal equinoxes, and are generally dry and warm, though when veering to the SW. they are accompanied with rain. The barometer generally gives warning of their approach by a sudden fall of 0.25 or 0.30 in., and perhaps more, and, though these are off-shore winds, the bar frequently becomes impassable when they blow strong. During the summer season, sailing vessels waiting tide to enter the river should stand off and on, keeping outside and well to westward of the bay, to avoid being driven on cape Villano by the NW. swell, should the wind fail.

The general mark for vessels under 8 feet draught approaching the bar is the churches of Portugalete and Sestao in one, SE. by S. southerly. Steer on this bearing until midway between Campillo point and Santurce; the western mole will then be end on, SE., nearly, which is the leading mark over the bar. When abreast the house called Casa del Campo Grande, about one-third of the way between Santurce and the pier-head, haul over to the middle of the river to avoid a ridge of loose stones with only 4 feet water over it at low tide, extending more than 200 yards from and in line with the western pier-head. A similar ridge, dry at low water, extends 400 yards from the eastern pier-head. Steer midway between the moles until abreast of Portugalete, where there is good anchorage in the middle of the river, and nearly as far as the bridge of Siete Ojos, about

three-fourths of a mile up the river, on the opposite shore. Should the wind be unfavorable for proceeding up the river, oxen for towing may be obtained at reasonable rates.

Coast.

From point Galea the white, almost vertical cliffs of the coast extend to the NE. and terminate near the mouth of Pléncia river. At $1\frac{1}{2}$ miles from Galea point is Sopelana beach, the only one in this extent of coast. It is small and foul. Half a mile to the northward of the beach is the steep, salient point of Meñacoz forming a little cove, where small craft anchor in fine weather. Near the entrance are the ruins of a battery and guard house. At $1\frac{1}{2}$ miles beyond Meñacoz point is point Machilando, steep and rocky, and forming the SW. limit of Pléncia bay; this bay is 3 miles across, extending NE. to Ormenza point; it is shallow, and about the middle of it is the entrance to Pléncia inlet.

Pléncia inlet.

Pléncia inlet extends in a southerly direction to the bridge of the town, under which boats pass to the mills above. At low water the estuary is dry, except a small pool with 3 or 4 feet water in it near the bridge. There are 9 to 10 feet on the bar at high springs, and it is open to NW. The entrance is between a large, high rock, called San Valentin, on the W., and Barrica point on the E. In the middle there is another rock, about the size of a boat, and in entering boats pass between this rock and San Valentin, but nearer the latter. As the entrance is very narrow and the sea breaks with any swell, the inlet is only frequented in summer by coasters and boats. The village of Pléncia, or Placéncia, is at the foot of a hill on the eastern shore of the inlet, more than half a mile from its mouth. Population about 1,000. It is not seen from seaward, but the houses of Gorliz on the sands of the same name are easily made out. The course of Pléncia river is about 21 miles, and it flows into the inlet through the nine arches of the bridge at the town.

Gorliz sands.

The sands of Gorliz lie eastward of Pléncia inlet, between Barrica and Gorliz points. All the coast between Galea point and cape Villano is moderately high and even, of whitish colored cliffs, and fronted by rocks. At a distance it appears like a group of sand-hills. It is exposed fully to the NW. sea, and a good berth should be given to it; but,

in the extreme case of a vessel being obliged to run ashore, the sands of Gorliz is a good place to save the crew. The extreme northern part should be selected, called Astongo, which is sheltered by the elbow formed by point Gorliz from the NW. sea. A small mole for the fishing-craft of Gorliz will be a mark for this point, beaching the vessel about 100 yards to the southward of it.

Cape Villano is a considerable promontory, salient to NW., with a lookout-house on its summit, about 900 feet above the sea. The western part slopes to the sea and terminates in a low, foul point, named Villano or Ormenza, with a reef extending seaward. Between Gorliz and Villano points are two sunken rocks, 100 yards off shore, and the same distance apart, that are only marked by the disturbance of the water over them. A low rocky islet, named Villano, lies NE. of the point of this name, about 200 yards off shore, with a boat-channel between it and the coast, where the sea breaks when there is much swell. A reef extends to the NNW. from the islet, and in bad weather the sea breaks nearly a mile outside it, when a berth of 2 miles should be given to it. Cape Villano.

At half a mile SE. from the islet is the true cape Villano, high, broad, precipitous, and foul, and between it and Villano point the coast forms a bight, outside of which is the islet.

At a little less than 2 miles E. of Villano islet, is the little bay of Armenza, open to the N., and surrounded by a foul beach, in which there is a small channel only practicable for boats in fine weather. The village, near the middle of the bay, is visible from seaward. Basorda bay, smaller than the former, is 1 mile farther E., and has a similar foul beach; it has no importance whatever. The largest of the three bays between capes Villano and Machihaco is Báquio bay, open to the N. and surrounded by a clean beach, through which a small stream, named Estepona, empties. The village of Básigo, which is seen from the eastward, is on the slope of a hill by the shore of the stream, and near the middle of the bay. At $1\frac{1}{2}$ miles NE. of this bay is the islet of San Juan de la Peña, or Gastelugache, high and rugged, and connected to the cliffs of the shore by a bridge of two arches. The chapel of San Juan is on the summit of the Coast.

islet, and is reached by an ascent of 372 steps. Just outside of the islet are two rocks awash, and off its SE. part, and close to the shore, is a small rocky islet. The islet and chapel of San Juan can be made out from a long distance, and make an excellent mark for this part of the coast.

Half a mile farther to the NE. is Aquech islet, high, round, and steep, and 200 yards off shore, with a boat-channel between. All the coast between capes Villano and Machichaco is exposed to winds from NW. to NE., and the sea is so heavy in its vicinity that a berth of 2 or 3 miles should be given it with cross-winds. It forms a shallow bight, and near the middle of it is a hill, named mount Jata, or Alto de Plência, a good mark for the capes, as it is the highest land in the vicinity.

Cape
chaco.

Machi-

Cape Machichaco extends from high land, and terminates in a point salient to the N. (Views 20 and 21.) The western side is of cliffs, while the eastern slopes gently to the sea. The cape is a spur of mount Sollube, which extends N. and S., and from the center of which rises the remarkable peak of Burgon; it may be known from E. or W. by a sudden break that shows in the face of the hill, and by its northerly projection; but from seaward it is blended with the high lands behind it, and it is difficult to make it out unless near enough to see the light-house. Two rocks lie a short distance off the foot of the cape, and a reef extends from it, where the sea often breaks a long way out, so that a berth of at least a mile should be given it.

Light: Lat. $43^{\circ} 27' 20''$ N.; long.
 $2^{\circ} 49' 26''$ W.

On cape Machichaco, there is a white circular tower attached to the keeper's dwelling, from which is displayed, at an elevation of 268 feet above the sea, a *fixed white* light, varied by a *flash every 4 minutes*, and visible 20 miles in clear weather.

Machichaco bay.

At half a mile eastward from cape Machichaco is Potoroarri point, with an islet of the same name close to it, and 2 short miles SE. by S. from this point is that of Uguerrey, the coast between forming the bay of Machichaco, about half a mile deep, with good holding-ground, and affording shelter from winds of the SW. quarter, and partly from those of the NW.; but these latter send in much sea, rendering the bay unsafe. Rocks lie close along the shore of the bay, which is generally steep, and a few reefs extend

Nº 51.



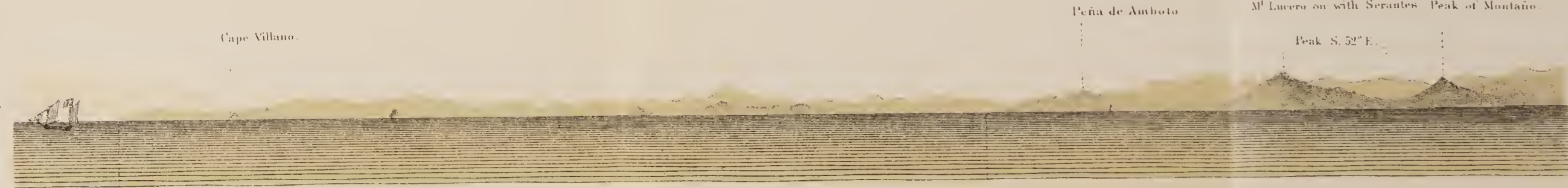
Peak of Cerredo

M^t Caudina

Castro Light. S. 51° W. Dist. $\frac{3}{4}$ of a mile.

Urdiales Bay

Nº 52.



Cape Villano.

Peña de Amboto

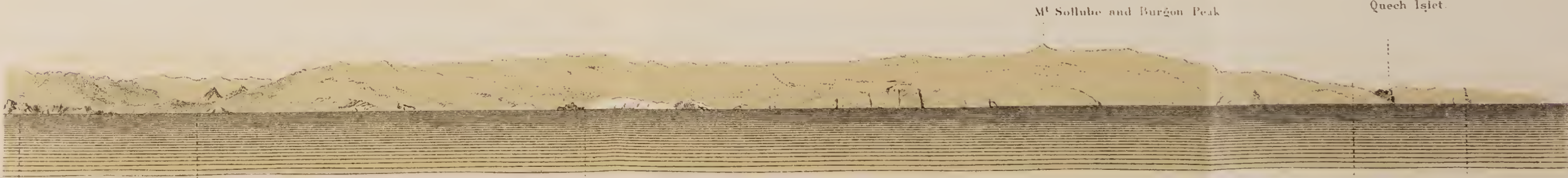
M^t Lucero on with Serantes Peak of Montaño.

Peak S. 52° E.

Cape Machichaco S 84° E. Dist 24 miles

Bilbao Bay

Nº 53.



M^t Sollube and Burzon Peak

Quech Islet.

Isaro Island

Mundaca River.

Bermco

Machichaco Light
S. 75° W Dist. 3 $\frac{1}{8}$ miles

Cape Villano.

out for about 100 yards : but there is one little beach, named Gibela, or Arichachú, where a landing may be made in fine weather, in an elbow W. of Ugnerrey point, and this is commanded by high cliffs.

The anchorage is dangerous in winter, for should a strong wind set in from N. or NNE., it would be difficult to leave the bay, and a vessel should always be ready to get under way, standing to the eastward at first, as soon as the wind draws higher than NW. With the wind at N. a vessel can run for San Sebastian or Pasages ; but the NNE. is a cross-wind and dangerous. The best berth, to be ready for leaving, is in 14 fathoms water, sand and mud, between Potorroarri point and the ruins of fort Valdés, with Arriederra islet—NE. of Isaro—in line with the hermitage of Santa Catalina de Lequeitio, and the Trompon Mayor on with the trees of the Atalaya of Bermeo, or the center of Isaro island on with the peak of Burgon SE. by E. $\frac{1}{2}$ E.

This position is half a mile from shore, over good holding-ground. The whole bottom of the bay is even, ranging from 11 to 17 fathoms in depth, sandy bottom, with rock near the coast. There are probably buoys at the anchorage. If surprised by a heavy gale, the vessel might be left riding to a full scope of chain, and the crew landed at Bermeo ; and this would be the most prudent course, for should the cable part, the ship would be driven on the rocks, where there is little chance of saving life.

Off Ugnerrey point, at about 75 yards' distance, there is a low rock, named Uguerraiz. Trompon Mayor is the name given the highest part of the land commanding Ugnerrey point, and where are the ruins of Trompon battery. Trompon Menor is another elevation farther W. The Atalaya of Bermeo is a high, level point, separated from Ugnerrey point by a break in the coast ; a short reef sets out from it, and there are the remains of a battery on its summit. Near this point is the rock of Salve-ach, that only shows at low water.

From Atalaya point the cliffs continue southward to port Bermeo, where the coast bends westward to form a cove 180 yards wide and 400 yards deep, called Puerto Mayor, while the basin inclosed by the mole is known as the Puerto Menor. The entrance to the basin is rather more than 100 yards wide ; at low water it is almost dry, and the bottom

Coast.

Bermeo.

is of stones, with a thin layer of gravel, and outside of the mole there are some large rocks that uncover at low water and are some protection from the sea. Puerto Mayor is also partly dry at low tide. The town stands on a ridge, facing S., and part of it is along the shore of the cove. It is not seen coming from the northwestward, but is partly visible in coming from NE. and E. The population is about 4,000, and the inhabitants are chiefly engaged in agriculture, drying and salting fish for exportation, and in fishing. There are some good pilots among them. They are good sailors and have excellent boats, and are prompt to render assistance. Provisions are easily obtained. It is easy to enter the port with winds from the NE. or SE. quarter, but with others it is necessary to work in, and on account of the little depths the vessels that visit the port are only quick-working craft of light draught.

Tides. It is high water full and change at Bermeo at 3^h; and springs rise about 11 feet. The ebb stream sets NNW., and the flood SE.

Laisuas rocks. At a little distance to the eastward of the rocks already mentioned, outside of the mole, is another group, named the Laisuas rocks, two heads of which uncover at low water, leaving a boat-channel with 3 or 4 feet water between them and the shore; they are dangerous, and should be avoided. Some years ago it was stated that they were to be marked by a beacon, but it is uncertain whether this has been done.

Coast. A short distance E. of Bermeo is the unimportant cove of Rosa, where the Cruz rivulet empties. Point Rosa, the eastern limit of the cove, is rocky and salient. At 100 yards NE. of the latter is Lamiaran point, which is really the eastern point of Bermeo cove. Thence a steep coast, fronted with rocks, trends eastward half a mile to Morgoa or Murgon point, off which is Morgoa islet, rugged and steep-to.

Mundaca river. Point Santa Catalina de Mundaca, one-third of a mile SSE. of the latter point, is on the W. side of the mouth of the Mundaca river; it is steep and has a few detached rocks at its foot, and a hermitage and the remains of a battery on its summit. The Mundaca river, formerly of considerable importance, is now so choked with sands that the channel on the western side is only navigable at

high water for vessels of 6 or 7 feet draught as far as Arteaga, and for boats as high as Guernica, interior villages. The bar is between a rock that always shows, close to the foot of Santa Catalina point, on the W., and the point of Laida sand on the E. The channel is only 14 to 16 yards wide, with 14 to 16 feet water at low tide on the outer part of the bar, diminishing rapidly to 3 or 4 feet. In entering it is necessary to pass close to the rock that marks the bar. With winds of the SW. or NW. quarter the entrance is difficult, as the eddy wind caused by a large church on the W. shore is apt to set a vessel on the banks. With northerly and northeasterly winds it is easy to enter, but generally, and especially in winter, the winds blow off the land. No stranger should enter without a pilot.

The town of Mundaca, with about 2,000 inhabitants, is on the W. bank about 300 yards within the bar. It is visible from seaward, as is the parish church already referred to. Here is a small harbor formed by a polygonal mole with a narrow entrance open to ESE., smaller than the port of Bermeo, and only large enough to accommodate a few coasters and the fishing-boats.

Mundaca.

It is high water, full and change, at the bar of Mundaca at 3^h; springs rise 11 feet. The reflux of the waters that enter on the flood and the water from the river and its tributaries cause a stream on the ebb that runs not less than 3 knots an hour at springs. The sea at times breaks a great distance from the bar.

Tides.

NE. by N. from Mundaca river, and at 1½ miles E. by N. from port Bermeo is Isaro islet, a third of a mile in length NW. and SE., and 130 yards wide, the SE. and highest part having an altitude of 150 feet. It is rugged and surrounded by reefs which extend off to a considerable distance, and should not be approached within a mile when there is any swell. A round, rugged islet, named Arriederra lies 100 yards off the NE. part of the islet, leaving a boat-channel between. Isaro islet is rocky on all sides, and the only vegetation is on the summit where there are the remains of a convent. From the highest part of the islet cape Machichaco bears NW. by W., Bermeo mole W. by S., and the hermitage of Santa Catalina de Mundaca SW. ½ S. The reefs of Isaro islet form a channel, 1½ miles wide, with

Isaro islet.

Uguerrey point, and another, more than half a mile wide, with point Santa Catalina de Mundaca, that carry $5\frac{1}{2}$ to 13 fathoms water, sand and patches of rock. The sea is heavy in the channels when there is any swell, and sometimes breaks.

Las Lobas.

Two rocks, named Las Lobas, lie between Isaro islet and Anzora point; they are nearly united, show at low water, and have a channel on either side, the more navigable being the northern, between the rocks and Isaro, which carries 25 feet at low water, and is quarter of a mile wide. In using it vessels should pass the rocks at a distance of 30 to 40 yards. The southern channel, between the rocks and Anzora point, is little used, having some sunken rocks in it; it is 50 yards wide and 17 feet deep. These channels should only be used with a smooth sea.

Coast.

The extensive sand of Laida almost chokes the mouth of Mundaca river, and is seen for a long distance in the break formed by the river itself, and, with Isaro islet, it forms a good mark for Mundaca and Bermeo. (View 53.) At the eastern end of this sand is the point of Anzora, also called Anzares, and Lara, rugged and surrounded by rocks. The village of Anzora is on the slope of the hill commanding the point. At 1 mile farther E. is the promontory of Ogoño, and between the two are the bay and beach of Anzora or Lara conspicuous from a distance. Beyond the beach the bottom is of sand with patches of rock.

Cape Ogoño.

A steep, flat-topped, and reddish-colored promontory at the eastern end of Lara beach, is known as mount Ogoño, and is conspicuous from its height and position. Its most easterly point is cape Ogoño. On the summit of the mount is a lookout tower at an elevation of more than 1,000 feet above the sea. (View 54.) A rocky islet, named Arguesto, is 100 yards off the SW. part of the promontory, the most salient part of which is 5 miles SE. by E. $\frac{3}{4}$ E. from cape Machichaco. The eastern part of the promontory forms a bight that retreats to the SW. and forms the port of Elanchove, inclosed by two solid moles, but only capable of sheltering a few coasters and fishing-craft. It dries at low water, and at high water, when there is sea from the NW., a considerable swell enters. The village of Elanchove, or Lanchove, is scattered along the heights over the port,

some of the houses being 460 feet above the sea. Population about 1,000, chiefly fishermen and sailors. On the E. side of the cape there is good summer anchorage in winds from SW. to W., where vessels of any draught may lie at 100 to 200 yards from the SE. part of the mount in 12 to 15 fathoms water, gravel, with Apiquel point on with point Santa Catalina de Lequeitio, and the church of Elanchove open of the cape. As it is necessary to anchor so close inshore in order to obtain shelter, it would be difficult to get away quickly in case of being surprised by an on-shore wind; the anchorage should not be used, therefore, by large sailing-vessels. In anchoring with strong westerly winds care must be taken against the heavy squalls and eddies that come down from the mount of Ogoño.

At $1\frac{1}{2}$ miles SE. by E. from cape Ogoño is Nachitúa, or Irnichú point, steep and surrounded by rocks, and on the cliffs above it are the houses of the village of the same name. Coast.

About 3 miles ESE. $\frac{1}{4}$ E. from Nachitúa point is point Apiquel, and the coast between the two forms Ea bay. The shore is all rocky, but about the middle of it there is a break to the southward with a small beach, where the little Ea river empties; the bar dries at low water. Fishing-boats and the smallest craft only enter at high water, and are sheltered by a mole within the bar. The entrance is narrow, and dangerous with any sea. The town, with about 1,200 inhabitants, is partly on each shore. There are many rocks in the vicinity of the entrance to the Ea, the most conspicuous, Callú-arrijaga, being half a mile to the eastward and a little off shore.

At half a mile E. of this rock, and less than 200 yards NW. of point Apiquel, is Cacharri islet, rocky and barren, with a boat-channel some 50 yards wide inshore of it. All the coast from cape Machichaco to this point is high and steep, with breaks and ravines that terminate at the sea in cliffs, some of which are of considerable height. There are numerous rocks near the shore, and at point Apiquel these extend out for more than 200 yards.

Point Apiquel or Ea point, sometimes called Montenegro, is rocky and salient, and separates the bay of Ea from that of Oguella; it bears ESE., nearly, from cape Machichaco, and WNW. $\frac{1}{4}$ W. from Santa Catalina de Lequeitio. There

are reefs around it and it must be given a wide berth, as the sea breaks a long way out.

Oguella bay.

From Apiquel point the coast bends to the southward to form Oguella bay, that terminates at point Santa Catalina de Lequeitio. The bay is tolerably deep; the shore is rocky, and there is only one place accessible in summer to boats that load with fuel and the products of a neighboring factory. The whole bay is strewn with rocks with some sandy patches, and a heavy sea sets in caused by the irregularity of the bottom.

Mount Otoyó.

From Santa Catalina de Lequeitio point the land suddenly rises and forms mount Otoyó, also called Alto de Lequeitio. (Views 54 and 55.) It is very steep to seaward and is easily distinguishable from the other mountains of this part of the coast. It has an elevation of 1,728 feet above the sea, and is a good mark for Lequeitio. Point Santa Catalina de Lequeitio projects from the base of the Alto de Lequeitio; it is steep on all sides, is about 140 feet high, and having a hermitage on it is very conspicuous. (Views 54 and 55.) The point is clean and steep to; from it the coast trends in a southerly direction to Amandarri point, from which a reef sets out, several heads of which uncover at low water. About 40 yards NW. of the point is a rocky bank that only shows at low water springs, and on the point there are a guard-house and the hermitage of San Juan.

Lequeitio bay.

The entrance to the bay of Lequeitio is between Amandarri point and the western end of San Nicolás island, 300 yards ESE. $\frac{5}{8}$ E. The bay extends 400 yards to SSW., and at its head is a clean sand-beach extending from the town to the mouth of the Lequeitio river. The sands are shifting. The depth of water is 4 to 14 feet in the bay, and 16 to 18 feet at the entrance. Occasional patches of rock are found. The port is inclosed by moles with an entrance open to ESE.; it is almost dry at low water, and the bottom is of rock with a light layer of sand. It can accommodate the boats of the vicinity and a few coasters, but considerable swell enters when there is a heavy sea setting in. The anchorage in the bay is good in fine weather, but vessels have to enter the port or the river if there is much sea from NW. or NE. It may be taken with facility with wind from SW. through N. to SE., but with a SW. wind it is necessary to

close with Santa Catalina point, and keep the coast aboard. The Lequeitio river empties in a little bight in the SE. part of the bay and is spanned near its mouth by a bridge of a single arch; the mouth is narrow and scarcely covered at low water. Within the mouth there is a hole deep enough for 5 or 6 boats to lie afloat when the tide is out. Small coasting-craft winter in the river. The bar or entrance to Lequeitio bay is between Amandarri point and Bar rock, near San Nicolás island; it is about 120 yards wide with 16 feet water near the middle, which is the best place to cross.

The town, containing about 2,500 inhabitants, is scattered around the shores of the bay, and near the beach S. of the entrance is the palace of Ulibarren.

On the extremity of the cliffs terminating Santa Catalina de Lequeitio point there is a blue conical tower with green lantern, from which there is displayed, at an elevation of 148 feet above the level of the sea, a *fixed white* light, visible 10 miles in clear weather.

Light: Lat. $43^{\circ} 23' 24''$ N.; long. $2^{\circ} 33' 32''$ W.

It is high water, full and change, at 3^h; springs rise 10 to 11 feet, and neaps about 6 feet. The flood stream is scarcely perceptible, but the ebb is felt in the channel formed by San Nicolás island, and the swell at times is inconvenient. The fishermen act as pilots.

Tides.

The island of San Nicolás is of irregular form, and is quarter of a mile long NE. and SW.; it forms two channels into the bay, the NW. channel being the principal; the eastern channel is almost dry at low-water springs. The ruins of a battery are on the summit of the island, and two houses on the southern slope. It is rocky on its NW. and N. sides, and is about 140 feet high.

San Nicolás island.

The Alto de Lequeitio—mount Otoyó—and the hermitage of Santa Catalina are good marks in coming from NW. or N.; and San Nicolás island, the town of Lequeitio, Ulibarren palace, and the conical hill of Calvario, 288 feet high, a short distance S. of the town, are good marks when coming from NE. or E. (Views 54 and 55.) To enter the bay, steer for the palace, giving Amandarri point a berth of about 30 yards. In the extreme case of a vessel having to run ashore on this part of the coast, the beach of Lequeitio may be chosen, as it is considered well adapted for saving the lives of the crew, and the boats and villagers are prompt

Directions.

to render assistance. The vessel should be beached as far to the westward as possible, and the soft character of the sand will secure the safety of the hull, especially if she is grounded at or near high water.

Sausaten bay. At $3\frac{1}{2}$ miles SE. $\frac{5}{8}$ E. from San Nicolás island is Santa Clara point, the coast between forming the bay of Sausaten. The shore of the bay is rather high, rocky, and broken, but clean and steep-to, there being 20 to 23 fathoms water, sand and mud, at 400 yards off it. The only villages to be seen are those of Endaidi and Mendeja, and two guard-houses. The NW. sea is not so heavy in this bay, on account of the depth of water and the smooth bottom, and in the opinion of the pilots it is a good anchorage for large vessels in winds from SE. to WSW. through S. The holding-ground is good, the anchors sinking well in. The best position is within a mile from the coast, between the two guard-houses, in 23 to 28 fathoms water. The only places approachable for small vessels are the coves of Endaidi, Chantarreca, and Barurdo, and the loading-places of Portuchiqui and Portuandi, and these only with a smooth sea. The British squadron in 1812 used to anchor off the cove of Endaidi.

Point Santa Clara, or Peña Mayor, is foul, and has a reef extending to SE. from it. It may be known by the conspicuous white hermitage of Santa Clara, on the slope of the hill that forms the point. Between it and Mocoa point, a little to the westward, the bottom is of rock.

Ondárroa bay. From Santa Clara point the coast recedes to the SW. and forms the bay of Ondárroa, surrounded by a beach, the SE. limit of the bay being Santurrarán point, distant 600 yards from Santa Clara. Reefs setting out from both points narrow the entrance. In the S. part of the bay is the mouth of the inlet of the same name, that trends a short distance to the southward, and then westward to the river Artibas.

Bar. The bar, though shifting, is good, and is reputed the best between Machichaco and San Sebastian, and as it is protected by Santa Clara point from the NW. sea, it may be taken almost always at high water, and when no others can be approached. There are 12 to 13 feet water on the bar at high springs, and 1 to 2 feet at low water. Within the bar the depth diminishes gradually, so that the inlet dries at low-water springs; but vessels can lie afloat near the bridge

of the town. The port is visited by boats and coasters of 8 or 9 feet draught, but the latter have to cross the bar at high water and with precaution, as the entrance is narrow.

At a little more than half a mile within the bar is a mole or landing-place, where coasters load and discharge, but they lie dry at low water, and the pier is covered at high water. The town of Ondárroa, containing about 1,800 inhabitants, is on the W. shore of the inlet, facing S., and is connected with the opposite shore by a bridge. The chief occupation of the inhabitants is fishing. The town has some commerce, and small vessels are built here. Provisions are readily obtained.

It is high water, full and change, at 3^h; springs rise 11 feet and neaps 5 to 6 feet. Inside the inlet the water is smooth, as no swell enters, and as the Artibas river is of inconsiderable size, no freshets are experienced.

Tides.

The best mark for Ondárroa from the westward is the Alto de Lequeitio, together with the point and hermitage of Santa Clara; and from the eastward the island of Guetaria, from which the vessel may be headed for Santa Clara point. To enter the inlet it is necessary to keep along the western shore, where the channel usually lies in a NE. and SW. direction; but no one not locally familiar should attempt to enter without a pilot. There are no regular pilots, but the fishermen act efficiently as such, and come out if signal be made for them.

Directions.

CHAPTER V.

FROM SANTURRARÁN POINT TO THE BIDASOA RIVER.

Variation in 1876.— $18^{\circ} 02'$ westerly; decreasing about $8'$ annually.

The province of Guipúzcoa is limited on the W. by Santurrarán point and on the E. by the Bidasoa river, the boundary-line between France and Spain. It contains about 35 miles of a rocky, broken, but generally clear coast, which takes a nearly E. and W. direction with a bend to the southward. The ports are few and insecure except Pasages, that alone deserves the name, and where vessels of 14 to 15 feet draught can enter.

As the coast of this province is visited in winter by strong NW. gales, the utmost precaution is necessary; for, if the small ports are missed, nothing awaits the vessel but a lee shore and probable destruction. For this reason every effort should be made to reach the port of Pasages, if neither Santander nor Santoña can be reached.

To avoid disaster it is strongly recommended to navigate near the coast, with a view to being able to recognize the land distinctly as it is passed, for the purpose of fixing the position of the vessel, as it is more or less obscured during NW. and SW. gales. Should it be necessary to stand off the land to wait for daylight, as much sail as possible should be carried, so as not to lose ground, for with the wind hanging steadily to the NW. the vessel will drift toward the head of the bay. When waiting for daylight in winter to enter any of the ports with a bar, and high water being from 9 to 11 a. m., a vessel should be in with the coast at daylight to take advantage of the favorable time for entering.

Currents.

It should be borne in mind that the currents are stronger in proportion as the head of the bay of Biscay is approached, and that there they turn to NE. and N., following the direction of the French coast. With a NW. gale they attain a

rate estimated at 4 miles an hour, and the pilots consider that they at times attain a rate of 5 miles. This strength of the current during the winter gales, that always haul to the NW. quarter, accounts for the many disasters on the banks of Arcachon and Cap Breton.

In summer, and during winds from the NE. or SE. quarter, the current usually sets W. or WNW. at the rate of 1 or 2 miles an hour.

The prevailing winds, both in summer and winter, are about the same as on the Biscayan coast; the sea raised by those from NW. and N., when they blow strong, is enormous, and sometimes lasts two or three days after the winds cease. When this sea rises during calm weather, it generally indicates the approach of a NW. gale; it is sometimes felt 24 or 48 hours before the wind. Winds.

The *galernas*, or the sudden shifts of wind to the S. or the NW., are more frequent on this than on the Biscayan coast. They only occur during the months of July, August, and September, after a prevalence of hot, southerly winds. It is seldom after a day of excessive heat that a *galerna* does not occur in the evening, the greatest strength of which lasts from ten minutes to half an hour. Occasionally the *galerna* comes on with the force of a hurricane without any warning. Many of the disasters that occur on the coast of Guipúzcoa during the summer, are occasioned by these sudden squalls that overtake vessels in a calm with all sail set.

It was stated in the preceding chapter that Santurrarán point is the eastern limit of Ondárroa bay; it is rocky, and has a reef extending off for a considerable distance. It is commanded by high, rugged land, the highest peak of which, Eyquilanchach, is on the boundary-line of the provinces of Biscay and Guipúzcoa. The beach of Santurrarán, completely exposed to the sea from NW., is on the western side of the point. From this point commences a stretch of high, rocky coast, commanded by an elevation known as mount San Nicolain. Santurrarán point.

At $1\frac{1}{2}$ miles from Santurrarán point, is point Cardal, salient to NE., with a reef of rocks extending from it to NNE. The sea is very heavy on the prolongation of this reef, and a berth of 3 or 4 miles should be given the point in a NW. Cardal point.

gale, and a vessel bound to Guetaria should keep cape Ogoño well open of Santa Catalina de Lequeitio.

Por Motrico.

Next to Cardal point is point Atalaya, or San Nicolás, barren and rocky, with a small lookout-house on its summit, called the Atalaya de Motrico, and southward of the point is a small cove with rocky shores receding to the SW. Here, between two small piers, is the little port of Motrico, where fishing-craft and small coasters find refuge. The mouth of the port is narrow, and open to the SE.; the bottom is of rock, and the port dries at low spring-tides.

Outside the entrance is a small space with 4 to $4\frac{1}{2}$ fathoms water, muddy sand, where vessels can lie in good weather; but if too large to enter the port they are in great danger if surprised by a gale. The port is only visited by small vessels, and in the summer, as during the winter, there is almost always a heavy sea from NW. on the coast.

The town of Motrico, with about 2,200 inhabitants, stands on the rather steep slope of the land commanding the port, and the white houses are conspicuous from a great distance when to the eastward of Cardal point. Besides the town of Motrico, Atalaya point and mount Arnó are good marks for this port. Mount Arnó, known to the sailors as Alturas de Arnó, is about 2,080 feet above the level of the sea, and is 2 miles inland, SSW. $\frac{1}{4}$ W. from Motrico; it extends to Ondárroa inlet, and terminates to the NW. in another and less remarkable mountain, called mount Arnosate.

Tides.

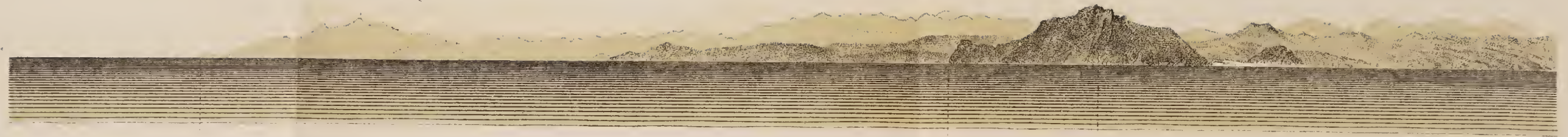
It is high water, full and change, at Motrico at 3^h; springs rise 10 feet. The current produced in the port, when there is much swell outside, is great, and is very trying to vessels anchored there.

Deva inlet.

At $1\frac{1}{2}$ miles eastward of Motrico is Arrangasiá point projecting to the NE. from the rugged coast; it is surrounded by rocks, and on its eastern side is an indentation with a smooth sandy beach, for which boats usually run when, on account of the swell or low tide, they cannot reach the port of Motrico or Deva inlet. To the southward of this beach is the bar of Deva inlet. The inlet at the mouth of the river Deva, which finds its source in mount Aramo, is of little utility to navigation, as the bar shifts and is nearly dry at low water, and the sea often breaks on it even at high water. The channel is partly formed by two parallel

Mount Lequeitio.

Nº 54.



Point S^{ta} Catalina S. 53° E. Dist. 9 miles.

Cape Ogoño

Mount Ogoño.

Calvario Hill.

Mount Lequeitio

Nº 55.

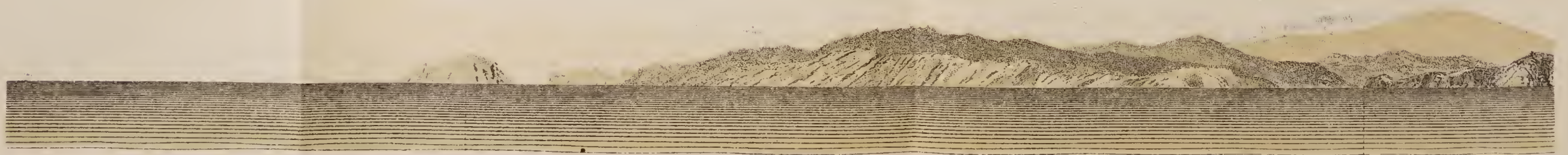


San Nicol's I^{le} S. 4° W Dist. 3/4 of a mile

Lequeitio.

Hermitage of S^{ta} Catalina N. 86° W

Nº 56.



Guetaria Island S. 63° E. Dist. 5 miles.

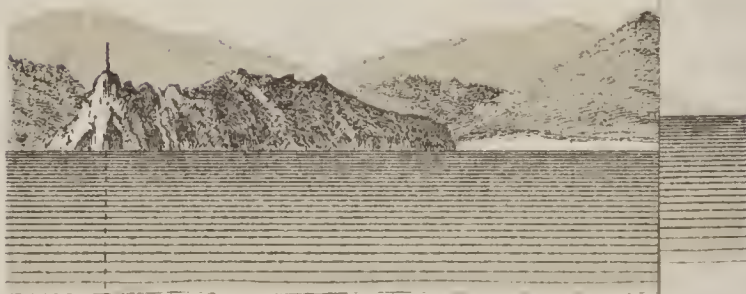
Zumaya Inlet

Nº 54.



Point S^{ta} Catalin

Nº 55.



San Nicolás Pt S. 4 W Dist ³/₄ of a mile.

5° W.

Nº 56.



piers that nearly reach the bar; it is narrow, and there is much swell in it when there is a sea outside. Beyond the narrow part of the channel the inlet widens, and on its eastern shore, on the NW. slope of mount Andúz, is the town of Deva, with about 1,200 inhabitants, chiefly sailors and fishermen. Coasting-vessels are built here.

The inlet is gradually filling up, and has very little water in it at low tide when the bar is dry, except in a narrow channel, through which the waters of the river flow to the sea. At high spring-tides there are 11 or 12 feet water on the bar.

Vessels bound to Deva inlet should take a pilot. The pilots are licensed, and one will generally be found off the bar. Fees are as at San Sebastian. Pilotage is obligatory.

It is high water, full and change, at 3^h, and the rise is 11 feet. The freshets of the Deva are strong, and vessels should be well secured. Each freshet clears and deepens the channel for a while.

The marks for Motrico are also good for this port; others are mount Andúz, 2 miles SE. of the town, and the conspicuous hermitage of Santa Catalina E. of the bar on a height commanding the point of the same name; and other good marks are the Piedras Blancas, whitish fissures in the rocks farther east.

Santa Catalina point is at the base of the hill of Santa Catalina, on which is the hermitage; it is the eastern limit of the bight at the entrance to Deva inlet, and at low water some detached rocks show around it. The sea breaks some distance out, and a berth of at least a mile should be given the point.

A little more than a mile E. of Santa Catalina point is Achurí or Piedras Blancas point, in the middle of a rocky bay; the point is surrounded by rocks, and the bottom is very irregular, causing much sea in blowing weather, when a berth of 2 miles should be given to it. Piedras Blancas is the name given to some whitish fissures in the land over Achurí point, which in some parts are 415 feet above the sea, and, being visible at the distance of about 20 miles, form an excellent mark for this part of the coast.

From Achurí point the coast runs eastward 2 miles, to Elorriaga point. The coast is rather high, of slaty cliffs,

and has rocks off it, so it should not be too closely approached. These cliffs terminate at San Telmo point, low, rocky, and surrounded by reefs; on a height above the point is a hermitage of the same name.

Zumaya inlet. To the eastward of San Telmo point is Zumaya inlet, that recedes to SSW., and receives the waters of the Urola river. The bar of Zumaya is a little better than that of the Deva, as it has more than 3 feet water on it at low spring-tides, but it can only be taken under favorable circumstances of weather, as the channel is very narrow; it lies between the western shore and the sands of Santiago. The Urola river is unimportant in summer, but in winter heavy freshets come down, for which vessels should be well prepared. Near the town there is sufficient depth for the vessels that frequent the inlet to lie afloat at low water.

Zumaya. The town of Zumaya is on the W. shore of the inlet, at the foot of a little peninsula, called mount Santa Clara. It is seen from seaward when it bears SW. There is a mole near it for mercantile operations. Vessels up to 120 tons burden load in the inlet with lime, wrought iron, grain, &c., and bring in iron-ore. Population, about 1,200.

Pilots. On account of the narrowness of the channel, no vessel should attempt to enter without the aid of a pilot. Pilot charges are the same as at Deva.

Tides. It is high water, full and change, at Zumaya at 3^h; and the greatest rise is 11 feet.

Light: Lat. 43° 18' 30" N.; long. 2° 15' 20" W. On mount Atalaya (Santa Clara?), at 140 yards from the shore and attached to the keeper's dwelling, there is a triangular yellow tower with white lantern, from which there is displayed, at an elevation of 135 feet above the sea, a *fixed white* light, visible 9 miles in clear weather.

Marks. The Piedras Blancas to the westward, and the island of San Anton de Guetaria, a short distance to the eastward of the inlet, are good marks for it; on nearing the land the hermitage of San Telmo, on a height over the W. point of entrance to the inlet, will be seen, when steer for it until near enough in with the land to signal for a pilot.

Coast. Beyond the sand of Santiago, that obstructs the entrance to Zumaya, is the small bay of Orruaga, with a little beach, and a rivulet emptying into it. A tile-factory stands near the shore,

Beyond Orruaga beach is the low, salient point of Izustarri with a number of rocks around it that show at low water. When there is a heavy sea it breaks a long way off shore, and the point should be given a berth of at least a mile. Vessels bound to Guetaria should keep 4 or 5 miles from Deva bay with a NW. wind.

From Izustarri point the coast turns to the SE. for a short distance to Bizcarraya point, low, rocky, and foul. Between these two points there is a break in the land, through which a streamlet flows to the sea. Eastward of Bizcarraya point is the bay of Gastea-tape almost entirely skirted by rocks, some of which uncover at low water. Within the bay there is a little sandy beach.

At the eastern end of Gastea-tape bay is San Anton or San Anton isl-
and. Piedra Alzada island, about three-fourths of a mile in circumference and rising 360 feet above the sea. It extends N. and S., and is connected with the main by a ledge of rocks, upon which a mole is built running NE. and SW., and about 150 yards long. The island is rugged with slaty cliffs on its NW. side, and terminates in two peaks, the northern one being the higher; on it are a light-house and the ruins of a hermitage.

The island and the coast to which it is united form Guetaria bay that terminates at Alzacoarriá point, and gives shelter from winds from the SW., and partly from the NW. quarters. The depth varies from 3 to 8 fathoms at low water, muddy sand, good holding-ground, and there is shelter from the westerly winds as far round as NNW., but not beyond, and at NNE. vessels are exposed to both wind and sea. The sea from NW. when heavy is disagreeably felt, but is not dangerous, but that from N. and NNE. is terrific; it seldom occurs, but in case of being surprised by it, it is generally better to secure the vessel as well as possible and land the crew. Effective assistance is given by the boats of the port. The best anchorage is in 5 fathoms at low water, sand, about 100 yards SE. of the mole. Anchorage. Smaller vessels may go closer inshore and make fast a cable to the new pier. There is a warping buoy at the anchorage, at which vessels may lie temporarily, and the placing of others is proposed.

It is intended to convert this bay into a port of refuge, as it is considered the outpost of San Sebastián and Pasages, and it is well for vessels bound to either of these ports in a SW. gale, which renders their entrance difficult, to put in here. It is also a good port for vessels bound to Orio or Zumaya when their bars cannot be crossed.

Port.

On the S. side of San Anton is the little port of Guetaria, formed by two moles inclosing a little space open to SW., and about 30 feet wide. It is almost dry at low water, and only fishing-boats and other small craft can enter. When there is much sea on, a disagreeable swell enters the port and the boats lie very uneasily. The bottom is of rock.

Guetaria.

The town of Guetaria is walled, and has a population of about 1,000. It is on the point of the main-land between two cliffs 90 and 150 feet high, and communicates with the port by way of the mole. There are few supplies of any kind obtainable. A fine bronze statue erected to the memory of the distinguished pilot, Juan Sebastian de Elcano, by the province, stands at the head of the bridge connecting the town with the mole.

Light: Lat. 43°
19' 05" N.; long.
2° 13' 06" W.

On the northern peak of San Anton island there is an octagonal white tower rising from the keeper's dwelling, from which there is displayed, at an elevation of 295 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

Tides.

It is high water, full and change, at Guetaria at 3^h; and the rise is 11 feet.

Directions.

San Anton island is the best mark in making Guetaria bay. In coming from the W. it will stand out well from the land and will be recognized by the saddle formed by its two peaks. (View 56.) The cliffs hide all of the town except the steeple and the roofs of a portion of the houses. In coming from the N. the island appears like a cone and is blended with the high lands of the main, but the white sand of the beach of Zarauz, eastward of Guetaria, will show the position of the bay. The bay may be entered with any wind. If the wind is from S. the beach of Zarauz should be approached as closely as the state of the sea will permit, and the southern shore kept aboard to the anchorage; but in this case it must be remembered that reefs set a short way out from Itegui point, and that there is the shoal of

Antimon-arria, which will be described farther on, to the SE. of it. With winds from W. to NW. give the N. point of the island a berth of one-fourth of a mile, and do not haul to the wind until the church spire in the town opens E. of the island. This is necessary not only to avoid the reefs near the point, but also on account of the swell and the eddy wind from the island. With westerly winds too strong to allow working in the bay, a vessel may anchor as soon as 8 or 9 fathoms water are obtained, when she will be sheltered.

Alzacoarria point, the southern limit of Guetaria bay, is low and surrounded by rocks; it is commanded by high rugged land. Between the point and the town of Guetaria there is a small sandy beach named Malcobre, and with the exception of this the shore is rocky and commanded by cliffs more than 90 feet high.

Point Itegui is a tongue of land projecting from the foot of a cliff half a mile SE. by E., nearly, from Alzacoarria point. At 200 yards SE. of it is the rock of Antimon-arria with a passage inshore of it 170 yards wide and carrying 5 to 8 fathoms water. The rock only shows at low spring-tides, when it has the appearance of a buoy; it is much feared by the coasters.

A short distance SSE. from Itegui point is that of Allé, projecting from the foot of mount Santa Bárbara, on whose summit there is a hermitage. This point forms the western extremity of Zarauz bay, a shallow bight that terminates to the eastward in Malla-arria point. A clear, level beach, $1\frac{1}{4}$ miles long, bounds the bay, but it is exposed to the worst winds of the coast.

The town of Zarauz—at present in a flourishing condition from its manufactures of textures and from its being a popular summer resort for strangers—stands on a plain near the beach in the western part of the bay. A small pier for landing extends from the middle of the town, and a rivulet discharges at the western end of the beach. Population about 1,400.

Point Malla-arria projects from the foot of a hill named Talayamendi, at the eastern end of the bay and plain of Zarauz; the point is surrounded by rocks, many of them showing, and the most conspicuous is Malla-arria, a rather

small, pointed rock, isolated at high water. A heavy sea sets in on the point, and a good berth should be given to it. At $1\frac{1}{2}$ miles N. of the islet there are 31 fathoms water, sand.

Orio inlet.

At $3\frac{1}{2}$ miles E. by N from Malla-arria islet is point Tierra Blanca, the coast of Orio bay between being high and rocky. The bay is funnel-shaped, receding considerably to the S., and almost in the middle is the mouth of the inlet of Orio that recedes to SSE., and then turns to the E. The entrance is very narrow, and the bar has only 2 feet water on it at low spring-tides. It is open to NNW., and a heavy sea sets in on it in on-shore winds. The channel lies between a ledge of rocks, skirting the eastern shore, and the cliffs of the opposite, so it is necessary to keep close to the western shore in entering, and then steer for and in the middle of the channel to the town; the bar is of shifting sand, and it is absolutely necessary to have the assistance of a pilot in entering. Within the entrance the inlet widens and the water deepens.

Pilots.

Pilotage is obligatory. There are regularly licensed pilots, and boats to render assistance. Very fine weather is necessary to enter or leave Orio inlet. Vessels bound for it when the bar cannot be crossed, anchor in Guetaria bay.

River.

The river Orio takes its rise in the Pyrennean range, passes Tolosa, and, after a course of about 33 miles, empties into the inlet above the town. It is of rather less depth than the Deva, but the freshets are very strong, and vessels anchored in the inlet must secure carefully for them.

Town.

The town of Orio, containing about 1,100 inhabitants, is a little more than half a mile within the bar, and on the eastern shore. There is a dock here where vessels of different classes are built for San Sebastian and other ports.

Tides.

It is high water, full and change, at Orio inlet at 3^h; and the greatest rise is 11 feet.

In coming from the W. San Anton island and the beach of Zarauz are good marks for this port, and from the E. the old and new light-houses of San Sebastian, that city itself, and mount Agudo, which forms a portion of mount Iguel-do, and is E. of the inlet. A good distant mark from the northward is mount Hérnio, which rises about 7 miles inland, S. by E. from the mouth of the inlet.

At 600 yards E. of the mouth of the inlet is the low islet of Aranarri, about 35 yards long in an easterly and westerly direction, and near the coast; inshore of it is a channel used by boats when the sea is smooth. Another and smaller islet, named Arribaton, lies eastward of this one, and near point Tierra Blanca. It is only about as large as a boat, and is covered at high water; only the smallest class of vessels can pass inshore of it. Coast.

A series of white cliffs mark the eastern limit of Orio bay, and form a point that projects somewhat to the N., but is only discerned from seaward when the sun shines on the cliffs. Above these is a peak called mount Agudo, or Mendizorroz, that attains an elevation of 1,514 feet above the sea, and forms a good mark for this part of the coast.

Point Tierra Blanca is followed by Galera point to the eastward, somewhat more prominent, and commanded by high land forming a part of mount Igueldo; a reef extends northward from it for a considerable distance, and a good berth must be given to it. Between this point and the eastern extremity of mount Igueldo, the coast forms the small bay of Galera, with a little beach near the middle of it. The bay is clean and navigable.

At the mouth of the Orio the coast becomes high and precipitous to San Sebastian bay, and the high land backing it is named mount Igueldo. The most remarkable elevation of the mountain is the peak of Agudo, a little to the eastward of Tierra Blanca point. The cliffs of this part of the coast are of a slate rock, and, when wet, reflect the rays of the sun and then appear in large white patches; but in cloudy weather they do not present the white appearance that has given them the name of Tierra Blanca, but have a grayish color that contrasts with the green appearance of the background. Mount Igueldo.

From the offing is seen mount Hérnio, beyond the high lands of the coast, with three peaks not very prominent, and rather close together, but sufficiently marked to distinguish it from the rest for a long distance. It is 7 miles inland southward of Orio inlet, and has an altitude of 3,537 feet. Farther to the westward is also seen above the high coast, another peaked mountain, named Itzarriz, which is nearly S. of Zumaya inlet and 6 miles in the interior. Both these Mount Hérnio.

mountains are good distant marks from seaward for the inlets of Zumaya and Orio, and the bay of Guetaria.

Monte Frio.

Mount Igueldo terminates to the eastward in a hill 623 feet in height, and with a slope of 45° to the N., named monte Frio. On the summit of the hill is a square tower formerly used as a light house, that is still an excellent mark for San Sebastian bay. The new light-house is on the northern slope of the same hill. (Views 58 and 59.) A rocky point, named Arruicobajá, projects from the foot of monte Frio, and a reef extends out from it that has $7\frac{1}{2}$ fathoms water on it at 200 yards from the shore.

Mount Urgull.

A hill very similar to the one just described, and named mount Urgull or Orgullo, is rather more than half a mile ENE. of it. It is steep, and forms a promontory united to the main-land by a low, sandy tongue of land occupied by the city of San Sebastian, the capital of the province of Guipúzcoa. The hill is covered with fortifications, the forts being generally of brick and of light construction, with only a few guns of small caliber. On the summit of the hill is the castle of Santa Cruz de la Mota, generally known as La Mota castle, 492 feet above the sea.

A quadrangular white tower, from which until lately a provisional light was shown, is on the NW. slope of the hill, and, contrasting with the dark background of the hill, is visible from a long distance, and is an excellent mark for the bay.

The cliffs of mount Orgullo are more conspicuous than those of monte Frio, and the whitish patches of slate rock of which they are composed are seen also from a distance. From the foot of the hill a short reef of rocks, named Calabaca reef, extends a little way to the NW.

Santa Clara isl-
and.

Between the two hills just described is a rocky islet 190 feet high, named Santa Clara island. It lies ENE. and WSW., and is more than 400 yards long, and on it there is a small white house on the site of the old hermitage of Santa Clara; there is also a light-house. The island is clear of danger on its S. and E. sides, is foul on the N., and is connected with monte Frio by a reef that uncovers at low water, and on which some stones, formerly deposited to form a port of San Sebastian bay, yet remain.

Nº 57.

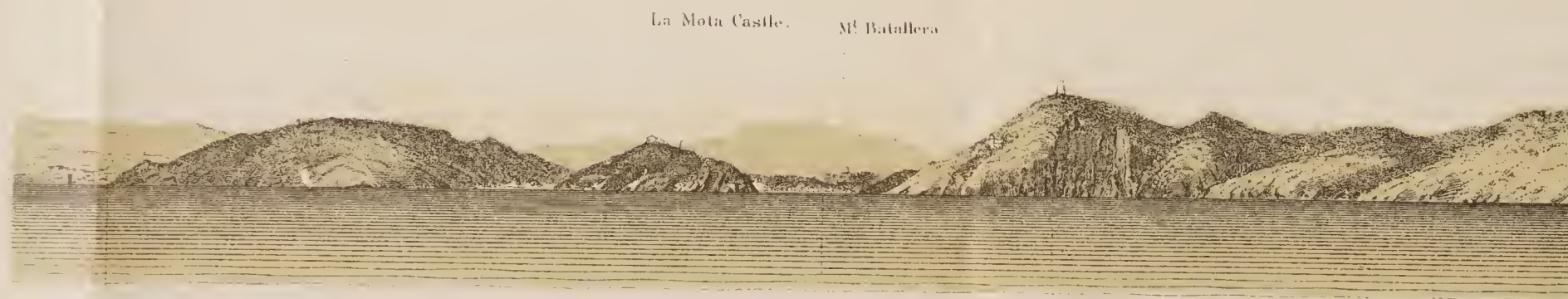


Cape Ibañeta

Pont Pasages

M^{te} Prio E. Dist. 6 miles.

Nº 58.

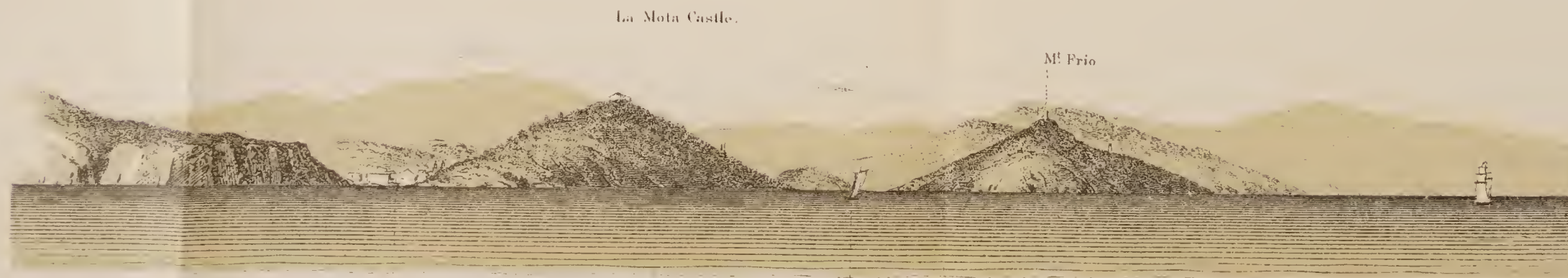


Pont Pasages

San Sebastian Bay

M^{te} Prio E.S.E. 4 m E. Dist. 2 miles.

Nº 59



San Sebastian

Entrance to San Sebastian Bay

A bank between 300 and 400 yards long ENE. and WSW., Bancha bank. is about 350 yards to the northward of Santa Clara island. It is called La Bancha, is of rock, and has $2\frac{3}{4}$ to $5\frac{1}{2}$ fathoms water on it at low spring-tides; the sea breaks on it when there is any swell. The channels between it and mount Urgull, and between it and monte Frio, are more than 400 yards wide and are equally clear of danger, and between it and Santa Clara the only dangers are close to the island. The depth of water is about the same in these three passages, being 7 to 10 fathoms in mid-channel, and either may be used.

Between the hills of Frio and Urgull the bay of San San Sebastian bay. Sebastian recedes to SE. for half a mile. The coast of the bay is low, and it is surrounded by a beach of white sand broad enough at low water to considerably reduce the capacity of the bay. The bottom is clean except in the SW. corner, and in the middle of the bay there are 3 to $5\frac{1}{2}$ fathoms water at low springs, but it is shallow on the western side. Vessels that cannot enter the basin anchor under the limited shelter of Santa Clara, where they are exposed to gales from NW. to NE., for the heavy sea that sets in through the channels E. and W. of Santa Clara island is occasionally sufficient to cause the loss of vessels and their crews.

There are seven buoys in the most sheltered part of the bay for the use of vessels. These buoys have large rings secured to heavy moorings, and vessels ride with two cables ahead and two astern, head to NNW.

The bay is not adapted in winter for vessels that cannot enter the basin, and those in the basin should not go out if there is any probability of a NW. wind, as the little shelter experienced, the impossibility of re-entering the port, and the great difficulty of securing properly, are weighty reasons against it. So that a vessel bound for San Sebastian in winter from the westward, and with bad weather from that quarter, should wait in Guetaria bay, or some other windward port, for a change of wind. The bay should only be entered with moderate winds that will allow of working in, if necessary, and of easily reaching the buoys. The ground-tackle usually carried by vessels is generally insufficient in this bay, and spare anchors and cables are obtained from

shore. The heavy sea that enters with on-shore gales sweeps the bottom, and, shifting the sands, carries with them the heaviest anchors. Hemp cables are preferred to chain, as they stand better the sudden surging of the swell. Finally, during these gales, any assistance from the shore is an impossibility.

Port.

At the foot of mount Urgull, on the southern side, is the port of San Sebastian, a basin formed by two moles running westward from the town and two others running eastward from the foot of the mount, with a narrow entrance. At high water vessels of 300 tons, or of 10 feet draught, can enter, but it is necessary to secure to the piers or to the other vessels, so as to remain upright when the tide is out, as a great portion of the port is then dry. A small pier has recently been constructed so as to form a basin in the southern part of the port, where the larger vessels can always lie afloat and secure from the swell from NW. It was constructed to contain 32 vessels, of 200 tons each. Vessels intending to enter the port anchor during fine weather off the entrance or under Santa Clara island to wait for a favorable time and tide. Large vessels should have the assistance of the country boats and men, as, from the position of the entrance and its narrowness, their aid is necessary. There is a store-house on the western mole, where spare anchors, cables, and other requisites may be obtained.

Town.

The town of San Sebastian, with a population of about 9,000, is strongly fortified, being defended by outworks on nearly all sides and commanded by La Mota castle. The fortifications immediately to the S. of the town have recently been demolished. It is connected with the interior by rail, but what portions of the contemplated roads are completed is hard to state. Some of them have been in part destroyed since 1871. It is a favorite summer resort. The houses are almost all modern, built uniformly in straight streets and regular squares, so as to present an appearance quite unlike most Spanish towns, and there are some fine public buildings. Manufactures are insignificant, and the commerce is carried on chiefly by small steamers and coasters. There is a considerable trade in English and French goods, corn, iron, wool, and other articles being exported.

Water is taken from a reservoir on the mole, and provisions may be easily obtained.

On the northern slope of Monte Frio there is a circular white tower attached to the keeper's dwelling, from which is exhibited, at an elevation of 428 feet above the sea, a *fixed white* light varied by a *flash every 2 minutes*, and visible 15 miles in clear weather. Lights: Lat. 43° 19' 33" N.; long. 2° 01' 01" W.

On the summit of Santa Clara island, at the eastern part, is a cylindrical tower of blue limestone, rising from the keeper's dwelling, from which is displayed, at an elevation of 174 feet, a *fixed white* light varied by a *flash every minute*, visible 9 miles in clear weather. Lat. 43° 19' 30" N.; long. 2° 00' 06" W.

There is an establishment for pilots at San Sebastian, and vessels are boarded well outside the bay in fine weather. If the state of the sea does not allow the pilots to go out they remain under the lee of the eastern point of Santa Clara island and signal with a flag to the vessel coming in. If the flag is kept upright the vessel is to keep on her course or head more to starboard or port, according as the flag is pointed. The pilot-boats are large and good sea-boats. Pilots.

Pilotage is compulsory for all vessels over 50 tons. Those of 50 to 100 tons pay 120 reals; those of 100 to 200 tons, 150 reals; and above 200 tons, 180 reals. Cables are hired at the rate of 28 reals a day.

There is a duty of 2½ reals a ton on all merchandise imported, called gate dues, or *cadena*.

It is high water, full and change, at the port of San Sebastian at 3^h, but the tide may be accelerated or retarded according to the wind. The rise at equinoctial spring-tides is about 14 feet, at ordinary springs 11 feet, and at neaps 5 or 6 feet. With strong winds from the NW. quarter the tide rises from 1 to 2 feet above the ordinary level, as at all the ports of this coast, and there is a corresponding depression with northeasterly and easterly winds. The tidal current is scarcely felt at the piers; on the coast in fine weather the flood sets E. and the ebb W. With gales from NW. or SW. there is a strong current setting E., that must be taken account of when near the shore. Tides and currents.

The bay can be taken with all winds except those from the SE. quarter, remembering the cautions already given in the description of the bay. With winds from SSW. to W., Directions.

and blowing hard, it is somewhat difficult to enter by the channel between Bancha shoal and Monte Frio on account of the eddy winds and squalls, caused by the mount. With wind from the NW. quarter one or the other channel may be used indifferently; and with wind from the NE. quarter the channel between Bancha shoal and mount Urgull should be preferred.

With a smooth sea small craft can pass over the Bancha, but it must be avoided when there is any swell, and when the sea is heavy the eastern channel should always be used, keeping in mid-channel, or at about 300 yards from mount Urgull.

When strong winds from NW. or N. prevail, the breakers on Bancha shoal, which show well, are the best mark for it. With winds from W. to NW. brace sharp up, as the current and swell set directly toward mount Urgull. With a heavy sea there are breakers outside of Bancha shoal, and a continuous breaker across the entire opening of the bay. Should such a condition be anticipated, a vessel should endeavor to enter some other port. In winter, and particularly during the months of January and February, when the land is humid and cold, the winds of the SW. quarter prevail on the coast, even when it is blowing a gale from NW. in the offing; so that it often happens that a vessel running with a strong NW. wind and a heavy sea, and confident of reaching the port, will find the wind grow scant, draw off shore, or fall calm. This is one of the greatest dangers a navigator can meet with in making for this bay, for, in the heavy sea, a vessel drifts unmanageable toward the land, the only hope being in the assistance of the boats of the port should they be able to go out.

Marks

The position of San Sebastian is easily recognized. Coming from the westward the large tower on Monte Frio will be seen. It is conspicuous, an excellent mark, and cannot be mistaken. La Mota castle on the summit of mount Urgull, the white square tower on the northern slope of the same mount, and the light-house on the northern slope of Monte Frio are equally good marks.

From a distance seaward mounts Hernio and Itzarriz are good marks for determining the position of the port, as well as mount Urdaburu, 6 miles inland, SE. $\frac{1}{2}$ S., from the

mouth of the bay, remarkable for two peaks on its summit inclining eastward, and lower down another one leaning in the same direction.

Another good point of recognition is mount Aya, or Tres Coronas, generally called Batallera. (View 57.) It is 9 miles ESE. $\frac{1}{2}$ E. from mount Urgull, extends NE. and SW., and is known by the three peaks on its summit, the southwestern being the least pointed, and all having an inclination in that direction. Its elevation above the sea is 2,780 feet. In approaching the land the bay will be distinctly made out, (Views 58 and 59,) and the island of Santa Clara, the houses of the village of San Martin at the head of the bay, and finally the town of San Sebastian will be seen.

In approaching the eastern passage to San Sebastian bay do not bring Santa Clara light to bear southward of S. $\frac{1}{2}$ W. The church of San Bartolomé (at the head of the bay on rising ground near the shore) in line with mount Urda-burn, SE. $\frac{5}{8}$ S., leads between Bancha bank and mount Urgull; and when the piers of San Sebastian are seen the vessel may take up a berth in the bay according to her draught.

The low, rocky point of Mompas or Animas is a short mile NE. $\frac{1}{2}$ E. from the northernmost part of mount Urgull. It falls in declivities from the high lands that form part of mount Ulía, and on a height commanding the point there is a lookout-house. Between mount Urgull and Mompas point is the bay of Zurriola, the shores of which recede to the SE. It is strewn with rocks and reefs, partly covered by a wide sandy beach that borders all the bay and dries out considerably at low water.

The Urumea river traverses this beach and falls into the sea by mount Urgull; it is of little draught in summer, but is navigable in part for boats. The bar dries at low water, and it is only at high water and in fine weather that boats can attempt it; once within the bar, however, they can go as high as the town of Astigarraya with the flood. The wooden bridge of Santa Catalina crosses the river near the bar.

At half a mile NE. by E. $\frac{1}{2}$ E. from Mompas point is point Talayero or Atalaya; it is high and steep, and at 400 yards

NW. $\frac{1}{4}$ W. from it is Pequechilla rock, covered with less than 3 feet water at low spring-tides; the sea breaks on it when there is any swell, but in case of necessity small coasters can pass inside of it.

Point Talayero is followed by point Arando Chico, which is $1\frac{1}{2}$ miles E. $\frac{1}{4}$ N. from it. This point is low and rocky, and is commanded by rugged land 460 feet high, called cape La Plata. Point Arando Chico is the W. point of entrance to the port of Pasages. All the extent of coast between points Mompas and Arando Chico is high and very rugged, and is a portion of the northern slope of the Sierra de Mirall, usually known as mount Ulía. Between cape La Plata and Arando Chico point the coast forms a little unimportant bay, named Illurguita.

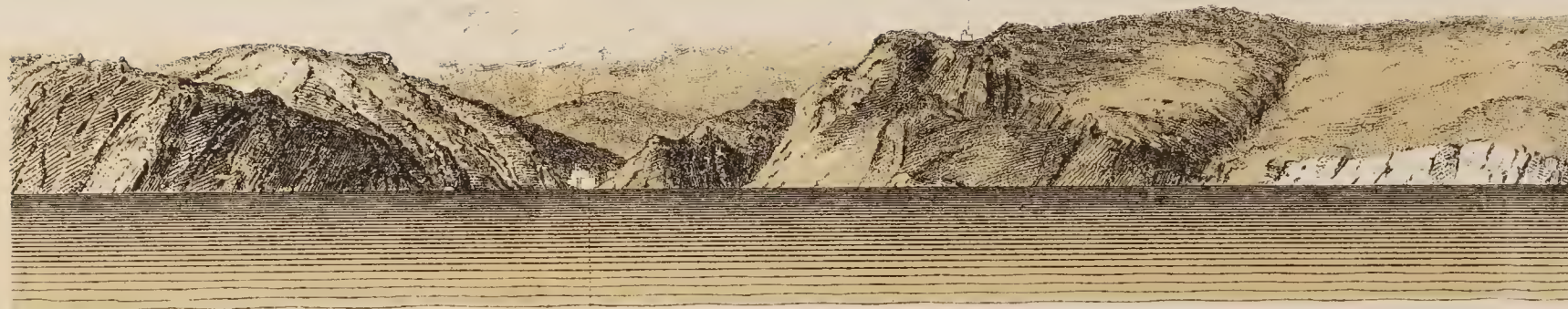
Port Pasages.

The rocky point of Arando Grande is 180 yards E. $\frac{3}{4}$ N. from that of Arando Chico, and forms the eastern point of entrance to the port of Pasages; both points, otherwise called Great Arando point and Little Arando point, are clean and steep to at low water, but at high water they are partly covered and the entrance appears wider than it really is. This beautiful port, which until latterly was frequented by the largest vessels trading along the Cantabrian coast, is to-day almost choked with mud; and the banks that dry at low water, and are gradually increasing from the deposit brought down by the freshets, already extend almost to the houses of the town. The land on either side of the entrance is high and rugged and from 450 to 550 feet in height, and within the entrance they are craggy and rugged; the entrance-channel runs from the middle of the mouth of the port SE. for 600 yards to Cruces point, with an iron cross on it, on the western shore; in this part the eastern shore is fronted by rocks extending out some 30 yards, and some of which show; the western is clearer for the first 300 yards, but thence to Cruces point it is bordered by a rocky shoal, called Los Sepes. Many of the rocks on this shoal uncover at low water, and between them there are from 1 to 3 fathoms water; the most salient of them are about 120 yards NNW. $\frac{3}{8}$ W. from Cruces point.

This point takes its name from the mount from which it projects, a high, rocky hill, with a rapid declivity to the channel of the port, and the mount takes its name because,

Pasages Lighthouse S. 30° E. Dist. 1½ miles

Nº 60

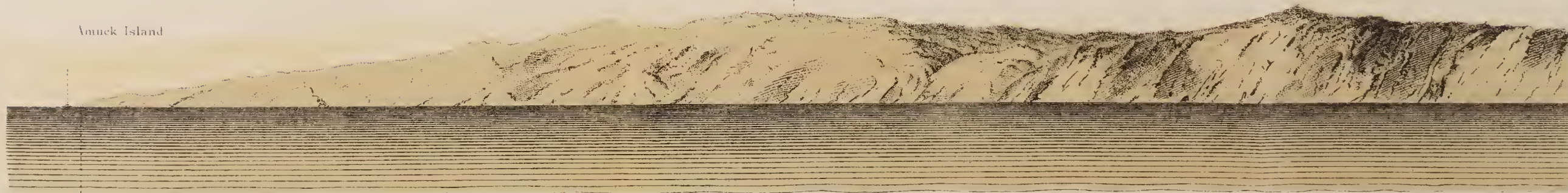


Entrance to Port Pasages.

Mt Jaisquiel.

Annick Island

Nº 61



Cape Higuera N. 70° E. Dist 7 miles .

at about one-fourth up, there were formerly several iron crosses, of which only one now remains.

From this point the channel turns to the S., and at 200 yards farther in, on the eastern shore, is the castle of Santa Isabel, at the foot of a high hill and close to the water. This is the first building seen on entering the port, and abreast of it the river is nearly 200 yards wide. The cove of Bursa is between the castle and Arando Grande point on the eastern shore, and that of Condemasti is on the western shore opposite the castle; each of them has a little beach where only boats can land.

From the castle of Santa Isabel the estuary gradually narrows, and at one-fourth of a mile S. by E. $\frac{3}{4}$ E. from the castle is the tower of Pasages and the battery of San Sebastian on the western shore. The tower is rounded to the E. and square to the W.; it is high and close to the water's edge. In former times it was used as the residence of the captain of the port and as a signal station. Abreast of the tower the channel is 120 yards wide, and here is the usual anchorage for vessels drawing more than 10 feet, in $3\frac{1}{2}$ to 4 fathoms water. Just beyond, both banks spread to form what was the spacious port of Pasages, receding 600 yards to the W., and more than half a mile to the E.; at the eastern extremity is the village of Lezo, and here the estuary turns again to the S. and terminates in an arm of the sea that receives the waters of the river Oyarzun. All this latter part can only be used for small craft, as it dries at low water.

The town of Pasages is built on both shores at the narrowest part of the port, at the foot of the hills that border the channel, and partly at the widening of the port facing the S. The town on the western shore is named Pasages de San Pedro, or more commonly Pasages de España, and has about 500 inhabitants, chiefly occupied in the fisheries and in navigation. That on the eastern shore is known as Pasages de San Juan, or Pasages de Francia. It has about twice as many inhabitants as the former, and has some building-docks and a few factories. On the western shore is the government dock. Communication with each other is kept up by boats. The government dock is now disused and in decay, that of the Philippine company is deteriorat-

Pasages.

ing rapidly, the forts are in ruins, and are only used as guard-houses, and it may almost be said that no trade is carried on. Besides the institutions already mentioned, there is a machine-shop where small vessels repair. The exhalations from the mud that lies dry at low water are very disagreeable in summer, but apparently not dangerous to health. There is much rain, but otherwise the climate is very pleasant; the hills are covered with underbrush, and in the little patches of cultivated land there is very luxuriant growth.

Behind fort Isabel is a strong spring of good, clear water that may be pumped directly into vessels at the bank. Coal is not always to be had unless ordered beforehand.

The hermitage of Santa Ana on the slope of the hill commanding the houses of Pasages de San Juan is the second building seen after entering the port, and is 600 yards SE. $\frac{5}{8}$ S. from the castle of Santa Isabel.

East and West
banks.

Outside the port are two rocky patches, one named East bank, 85 yards long E. and W., and about 200 yards NE. $\frac{1}{4}$ E. from Arando Grande point; there are from three-fourths of a fathom to $1\frac{3}{4}$ fathoms water over it, and from $3\frac{1}{2}$ to 6 fathoms in the channel, about 100 yards wide between it and the coast. Close to on its northern side there are 11 to 12 fathoms.

The other, the West bank, is NNW., nearly, from point Arando Chico, distant about 160 yards; it is about 135 yards off shore, and there are 1 to $2\frac{1}{4}$ fathoms water on it at low spring-tides, with $4\frac{1}{2}$ to 9 fathoms between it and the shore, and $4\frac{1}{2}$ to $5\frac{1}{2}$ immediately around it. Eastward of it and toward the entrance to the port there are 20 fathoms.

To clear the West bank in coming from San Sebastian it will be sufficient to keep 400 yards off shore when near the port of Pasages, and not to change course to the S. until Santa Ana hermitage is seen open of Cruces point. And to clear the East bank in coming from the eastward along the coast it is sufficient to keep 200 yards off shore until N. and S. with point Arando Grande, or until the mouth of the port is open. The sea breaks on both these banks when there is any swell. The projects for marking the banks with beacons have probably been interfered with by the

disturbed state of the country or the decadence of the port, as no information has lately been published in that regard.

On cape La Plata, near the W. point of entrance to port Pasages, there is a circular white tower, 47 feet high, from which there is displayed, at an elevation of 484 feet above the sea, a *fixed white* light, visible 10 miles in clear weather.

Light: Lat. $43^{\circ} 20' 10''$ N.; long. $1^{\circ} 56' 33''$ W.

The leading light shown on the hermitage of Santa Ana was extinguished April 22, 1875, and in its place three provisional lights are shown, as follows: On the northern part of the wall of the castle of Santa Isabel there is a *fixed red* light, visible 3 miles in clear weather; and on the southern part of the platform of the same fort there is a *fixed white* light, visible 3 miles in clear weather. These two lights in line lead through the outer part of the entrance channel, clearing the points of entrance, the banks outside, and Cruces point.

Harbor lights.

A *red fixed* light on the store-house of military supplies comes in sight as soon as a vessel is clear of Cruces point, and leads through the inner part of the channel. Vessels may anchor as soon as the castle of Santa Isabel is passed.

At the port of Pasages and the other harbors on this coast the activity of the native seamen alleviates the dangers considerably, as they are always ready with their boats in piloting and towing in. Here, as at San Sebastian, the regulations ordain that the first boat reaching the vessel must be employed, and if more than one is needed they are taken in the order in which they come alongside. Both men and boats are well qualified for towing, mooring, or warping. When the sea is sufficiently heavy to prevent their going outside they remain under the lee of Arando Chico point, and signal to the vessel with a piece of cloth or a handkerchief on a stick which is pointed in the direction the vessel is to head, or held upright if she is to keep her course, and the pilot boards directly she is within the points. At night a lantern is used that sometimes causes mistakes, and great attention is necessary. In bad weather, when they cannot venture out, a lookout man is stationed on the heights near the mouth of the harbor to signal the approach of vessels, and if necessary a gun is fired to attract attention.

Pilots.

The pilots are regularly licensed, and it is compulsory for all classes of vessels to pay pilotage. Those under 50 tons pay 58 reals; from 50 to 100 tons, 144 reals; from 100 to 200 tons, 196 reals; and those above 200 tons, 220 reals. Boats used are paid for besides the pilots, by a regular tariff; and in bad weather vessels may depend on a supply of anchors, cables, hawsers, &c.

Tides.

It is high water, full and change, at the port of Pasages, at 3^h 20^m; equinoctial tides rise 15 feet; ordinary springs 12 feet; and neaps about 9 feet. The ebb stream runs sometimes 3 miles an hour.

Directions.

In making the port of Pasages from the westward its position may be recognized by the light-house at San Sebastian, and La Mota castle. One of the best marks from seaward is the light-house of cape La Plata, on a plain above the cape, and remarkable for its whiteness, but it is only seen when at least 1 or 2 miles northward of the port, as, if close inshore, it will be shut in by the land. From a long distance seaward, when the light-house cannot be distinguished, mount Urdaburn, 5 miles in the interior, S. of the port, is a good mark, and also the mountains of Jaisquivel and Batallera to the eastward, mounts Urgull and Frio to the westward, and the ravine or break of the opening of the port. (Views 57 to 61.) The land eastward of the port is flatter than that to the westward of it.

Should the weather be thick or foggy, the approach to the harbor is well indicated by the soundings, as at 15 miles northward of the entrance the depth is 90 to 110 fathoms, gradually decreasing to 25 or 30 fathoms at about 2 miles from the coast, over sometimes a sandy and sometimes a rocky bottom.

Winds from WNW. to ENE. through N. are fair for entering. Other winds are ahead in the different turnings of the channel, which is too narrow to admit of tacking. In moderate breezes from the SE. or SW. quarters, vessels can kedge or tow with the flood to an anchorage within the entrance. A W. wind at first appears fair, as it draws to NW. within the entrance as far as Cruces point, but here it veers to SW., with squalls, placing the vessel in danger, as this is the narrowest part of the channel, and it is only when this wind is light that a vessel can tow past the castle.

When bound, therefore, to this port from the westward with a W. wind and bad weather, if possible run into San Sebastian and wait for a change, or, if sufficiently far to the westward, find shelter in Guetaria bay, the anchorage there being safe and easily taken.

A sailing-vessel entering the harbor should have a fair, fresh wind and a flood-tide. A moderate wind outside generally dies away between Cruces point and Santa Isabel castle; but the tide, added to the ship's way, with boats to assist, will keep her out of danger. The sea also should be moderate at the entrance, for with a heavy sea outside the water is so disturbed in the harbor as to prevent the vessel's steerage.

Steering for the harbor, the first buildings seen will be the castle of Santa Isabel, and about a quarter of a mile within it, on the same shore, the chapel or hermitage of Santa Ana. When about a quarter of a mile from the entrance, the hermitage of Santa Ana just open of the iron cross on Cruces point, or the extremity of Cruces point on with the western angle of Santa Isabel castle, or the E. point of entrance on with Cruces point, will lead to the entrance and clear of the East and West banks. When within the points borrow toward the eastern shore to clear the bank of Los Sepes, off Cruces point, keeping pretty well over until the tower of Pasages, at San Sebastian, is midway between the above point and Santa Isabel castle, when head for the tower, keeping midchannel, in the deepest water, until the castle is passed, when bring up with a stern anchor in $3\frac{1}{2}$ to 4 fathoms water, and run a stout hawser out from each bow to rocks on shore bored through for the purpose. At high water there will be room for the vessel to swing, when moor head and stern, especially in winter, when a sea sets in and whirling gusts of wind rush down through the breaks in the hills around the harbor. Small vessels that can go within the tower of Pasages experience less effect from the swell, and lie secure in all weathers. The anchorage for larger vessels is nearer the eastern shore, where the water is deepest and the strength of the current least.

At night the *fixed red* and *fixed white* lights on Santa Isabel castle lead through the outer part of the channel, clearing the banks, Arando Chico point, and Cruces point; but in

bad weather a vessel should open the lights a little by borrowing toward the eastern shore, so as to make sure of clearing Los Sepes bank. When clear of Cruces point the *fixed red* light on the store-house comes in sight, and leads through the inner part of the channel and past the castle.

The *fixed white* light on cape La Plata goes out of sight when a vessel is 118 yards distant from Arando Grande point, and is seen again when she is 110 yards distant from point Cruces, so that on dark nights a vessel keeping within the limits of obscuration of the light will keep at a sufficient distance from the points.

Steam-vessels, from their facility in being able to enter at any time, will find Pasages an excellent port of refuge, and those lying at San Sebastian should make for this port at the appearance of bad or threatening weather.

Mount Jais-
quivel.

Mount Jaisquivel rises from the eastern bank of port Pasages, and extends 7 miles NE. by E. to cape Higuera. This mount is also called Olearzú or shoulder of the mountain, in allusion to its being the last of the Pyrenees toward the sea-coast. It gradually rises to its highest point about 4 miles from the cape, where it attains an altitude of 1,940 feet above the sea, and whence it slopes again gradually to the cape. (View 61.) It has various inequalities on its summit, and the coast at its base is barren, rocky, and in part of cliffs. The most salient point of this coast is point Turrulla, $3\frac{1}{2}$ miles NE. from the mouth of port Pasages. This extent of coast is clean, and only about the point there are a few rocks. From Turrulla point the base of mount Jaisquivel extends in a rather more easterly direction for $3\frac{1}{2}$ miles to cape Higuera, with nothing notable about it except Asabaratza bay, a little break in the coast, where there is a small beach that boats can approach when the sea is smooth.

Cape Higuera.

Cape Higuera is the eastern termination of mount Jaisquivel and the W. point of entrance to Fuenterrabia bay. It is rocky and is surrounded by reefs that uncover at low water. (Views 57 and 61.) The rocky islet of Amuck lies about 200 yards northward of the cape, is of moderate height, rugged, and is connected with the main by a reef that uncovers at low water, and by means of which the island may then be reached. Another reef extends NNE.

from the islet and it must not be too closely approached when there is any sea. At 600 yards from the islet, and on the southern cliffs of cape Higuera, is the castle of this name; there is also a light-tower about 20 feet high on the northern cliffs.

On cape Higuera there is a white stone tower, from which is exhibited, at an elevation of 285 feet above the sea, a *fixed white* light, visible 7 miles in clear weather. A late Spanish *Hydrographic notice* states that this light is at present extinguished. When displayed, care must be taken not to mistake for it the *fixed white* light on point Socoa, 6 or 7 miles to the eastward.

Light: Lat. $43^{\circ} 23' 50''$ N.; long. $1^{\circ} 47' 56''$ W.

The anchorage of Higuera is ESE. of Higuera castle, protected by the cape from winds from the SW. and a part of the NW. quarters. Up to WNW. the shelter is good, but with wind at NW. or NNW. a heavy sea sets in. The best berth is 400 to 600 yards E. or E. by S. from the castle, according to the vessel's draught, in 6 to 8 fathoms water, muddy sand, good holding-ground. During strong NW. winds this anchorage should not be used, particularly in winter, because if the wind veers to NNW. or N., a vessel would have no shelter, and unless of very light draught could not run for Fuenterrabia.

Anchorage.

The E. point of entrance to Fuenterrabia bay is the French point of Santa Ana or Arretas, $1\frac{1}{2}$ miles E. by S. from cape Higuera. Point Santa Ana is surrounded by reefs, and close off its western side are two round rocks, resembling towers.

Fuenterrabia bay.

At two-fifths of a mile NE. of the point are the Black rocks, Roches Noires, that show at low water, and at three-fourths of a mile N. of it is a ledge of rocks, named Briquets reef, extending two-fifths of a mile E. and W., several heads of which uncover at low water. The reef is narrow, and between it and the Black rocks is a channel 600 yards wide, but with many dangerous rocks in it. The soundings close around the reef are 3 to 7 fathoms, increasing rapidly to seaward, in which direction there are 17 fathoms at the distance of less than three-fourths of a mile. The soundings between these reefs and the cape are from $4\frac{1}{2}$ to 16 fathoms, the bottom being generally of rock on the French side, and sand and mud on the Spanish.

The bay is only three-fourths of a mile deep to the SW., as it is then almost completely filled by the sands.

Inlet.

From Higuera castle the coast runs SSW. high and cliffy, for four-fifths of a mile, and then SSE. to the town of Fuenterrabia, $1\frac{1}{2}$ miles distant from the castle. The banks of sand that extend out from both the French and Spanish shores form the inlet or channel of Fuenterrabia, accessible for vessels of 10 feet draught under favorable circumstances.

Bar.

The bar is shifting, but is generally near the Spanish shore. It dries 2 or 3 feet at the lowest tides, but within it there are $2\frac{1}{2}$ to 5 feet at low water in the channel that leads to the village and mole of Magdalena, about 400 yards northward of Fuenterrabia. The wash of the Bidasoa river and the sands thrown up by the sea have formed and are forming large banks that are gradually extending farther out, and constantly changing in form and height, with only narrow and tortuous channels between them. In cases, as at Magdalena, villages have been built on these banks, and their surfaces are utilized for the purposes of cultivation. The bar is constantly advancing, and in course of time will, no doubt, be abreast the cape. When there is a heavy sea it sometimes breaks as far out as the castle. This fact, together with the instability of the channel and the little commerce of this locality, causes the inlet to be frequented only in summer and by coasting-craft and boats that bring iron-ore and coal for the factories of Navarre, to which these articles are lightered by way of the Bidasoa; and load with timber for Bilbao and Santander.

No directions can be given for crossing the bar. Vessels that have to enter the inlet take a pilot, usually one of the fishermen, and pay as at San Sebastian. The smallest craft can go with the tide as high as Irun, where there is a mole, and the larger moor off Magdalena.

Irun.

Irun, the first town on the Spanish frontier, has about 2,800 inhabitants. It is on the southern slope of mount Jaisquivel, and the road to France passes through it. Near it is the Ile de Faisans, or island of Pheasants, covered with vegetation, but scarcely above water.

Fuenterrabia.

Fuenterrabia is also on a height setting off from mount Jaisquivel, on the western shore of the inlet. It was formerly of considerable strength, but is now a miserable, dilapidated

place. The inhabitants, numbering about 800, are chiefly engaged in fishing.

The Bidasoa river, the boundary-line between France and Spain, is navigable for lighters for a considerable distance. Its waters fall into the inlet above the bridge of Behovia, the first town on the French frontier. Beyond the Ile de Faisans are large banks of muddy sand, formed by the river and tidal currents. One of the channels kept open by the stream passes by the village of Hendaye, a French town on a little eminence three-fourths of a mile E. of Fuenterrabia.

Bidasoa river.

It is high water, full and change, at the bar of Fuenterrabia at 3^h 15^m, and the rise is 12 or 13 feet. The velocity of the ebb-stream at springs is 3 miles an hour.

Tides.

The best mark for Fuenterrabia bay is mount Jaisquivel to the westward, which terminates to NE. in cape Higuera. Another mark from the offing is mount Aya, or Batallera, already described, 6½ miles inland, and S. of cape Higuera; and another distant mark is mount Larrum, 8 miles SE. ½ S. from cape Higuera. The latter mount will be known by its conical appearance, when bearing southeastward, and by the hermitage on its summit.

Marks.

In approaching from the westward it is only necessary to give Amuck islet a good berth, on account of the reef northward of it. Approaching from the eastward give point Santa Ana a berth of a mile to avoid Briquets reef. Amuck islet, W. by S., leads N. of the reef; and Santa Ana point, SSE., or Fuenterrabia church, SW. by S., leads westward. There are 2½ to 7 fathoms water between the reef and the Black rocks, but no vessel should attempt this passage. With the exception of a rocky patch with 23 feet water on it, in the middle of the bay, the bottom is clear and the depths decrease gradually toward the bar. Give the shore of the cape a berth of a quarter of a mile in passing.

Directions.

The prevailing winds in this locality in winter are from SW. and NW., generally with rain. In summer, gales from E. and NE., with clear weather, are frequent. The currents generally follow the direction of the wind.

Winds.

WEST COAST OF FRANCE.

BY

LIEUT. SEATON SCHROEDER.

UNITED STATES NAVY.

CHAPTER VI.

INTRODUCTORY REMARKS ON FRANCE.

The portion of coast described in this work is that comprised between the Bidasoa river, the boundary between France and Spain, and Melgorne point, the northwest extreme of France. The work includes Ouessant island.

South of the Gironde river this coast is rather low and uniform, with sandy downs, and is generally clear of outlying dangers. Farther north it is higher, broken, and skirted by islands and numerous shoals.

For winds, currents, and soundings see Chapter I.

The question of tides is one of special interest on the French coast, as regards both the rise, which opens to navigation a number of ports that otherwise could not be entered, and the currents, which, independent of the oceanic eddies, frequently serve to shorten passages. Tides.

The tide-wave, which in mid-ocean is several thousand miles in length, obeys laws similar to those that govern the ordinary waves of the sea. Its height depends greatly upon the inclination of the plane over which it advances, being least where the great depths approach most closely to the shore. Thus, at the head of the bay of Biscay, where great depths are found at short distances off shore, the tides rise very little. Leaving the slope of the Pyrenees the rise and fall increase northward, as the 100 and 200 fathom lines of soundings diverge from the coast, and a difference of level of $9\frac{3}{4}$ feet at Saint-Jean de Luz becomes one of $17\frac{1}{3}$ feet at the mouth of the Gironde, $19\frac{1}{2}$ feet at Aix island, and $26\frac{1}{4}$ feet at Brest. Off the first depths of 90 fathoms are found at 15 miles, and off the last at 85 miles.*

* The amplitude of the tide-wave is also affected by local causes. Off the Pertuis the height of the tide is far from equal to that near l'Ile d'Aix. On the Plateau de Rochebonne a rise of $11\frac{1}{2}$ feet corresponds to one of $16\frac{1}{2}$ 40 miles to the eastward.

As regards the propagation of the tide, the velocity of the wave varies with the depth of water; this is forcibly illustrated in the comparison of Brest and the port of Pasages; the former city is to the westward of the latter, and yet, although the tide-wave comes from the westward, high water occurs on full and change days 32 minutes earlier at the latter than at the former.

This apparent inconsistency is explained by consideration of the fact that the speed of the tide-wave is greatly diminished by the shoaling of the water; the velocity, which is 300 miles an hour in the Atlantic, is reduced to 13 miles in the mouth of the Loire. The change in depth from 2,700 fathoms to 4 fathoms, produces a diminution of $\frac{22}{3}$ in the velocity.

During neaps the foregoing does not always obtain. For instance, at Aix island, while the retardation of spring-tides is 15 minutes as compared with the port of Pasages, during neaps high water occurs after the time of the same at Brest. This is due to local influences.

The practical result of all the preceding is, that the height of the tide increases from south to north along the French coast, and the times of high water vary but little between the extremes.

Tidal currents. In the study of the tidal currents off the French coast, it will be noticed that their rotation is always effected *with the sun*, or in the direction of the hands of a watch. This is exactly opposite to that of the general current of the gulf, and is possibly brought about by that very fact. At low water the course of the tidal stream varies from north to west between the Spanish coast and Ile d'Yeu; but farther north it is WNW. and WSW. Near Penmarc'h the greatest speed is ordinarily two hours before low water, and the least at high water. In the offing the change of direction takes place later, sometimes as much as $1\frac{1}{2}$ hours after low water. In many places, including the Pertuis, the neighborhood of La Teignouse rock, and off the entrance to Le Morbihan, slack-water ebb often occurs 40 minutes after low water.

The maximum speed of the flood is generally felt before half-tide, and is always inferior to that of the ebb. The current generally begins to set in briskly under the surface, stirring up the mud at the entrances of rivers. Its effect is

often noticed in this way, while the ebb is still running out at the surface.

In the interior of some of the estuaries indenting the coast, the direct movement of the currents is reversed.

Observations of the lower currents show that they rotate in the same way as those at the surface, but are generally half an hour ahead.

Tide-signals are made by means of balls and of flags, exhibited from a mast and yard. The former are used to denote the depth of water in the channel; the latter, to indicate whether the tide is ebbing or flowing. Tide-signals.

To summarize the accompanying table, a ball at the intersection of the mast and the yard denotes a least depth of $9\frac{1}{2}$ feet throughout the channel.

Each ball on the mast, under the first, adds $3\frac{1}{4}$ feet.

Each ball on the mast, above the first, adds $6\frac{1}{2}$ feet.

A ball at the yard arm, seen to the left of the mast, denotes an additional depth of about 10 inches.

A ball at the yard arm, seen to the right of the mast, denotes an additional depth of about 19 inches.

In ports where it is not necessary to be so precise, the mast is not fitted with a yard, and the depths are only given in whole metres.

To indicate which tide is making, there are used a white flag, with black diagonal cross, and a black pennant. They are only shown when the depth in the channel exceeds $6\frac{1}{2}$ feet.

When the state of the sea forbids entering the port, a red flag is substituted for the other signals.

TABLE OF TIDAL SIGNALS.



9 ft. 10 in.



10 ft. 8 in.



11 ft. 6 in.



12 ft. 4 in.



13 ft. 2 in.



14 ft.



14 ft. 10 in.



15 ft. 8 in.



16 ft. 5 in.



17 ft. 3 in.



18 feet.



18 ft. 10 in.



19 ft. 8 in.



20 ft. 6 in.



21 ft. 4 in.



22 ft. 2 in.



23 feet.



23 ft. 10 in.



24 ft. 8 in.



25 ft. 6 in.



26 ft. 3 in.



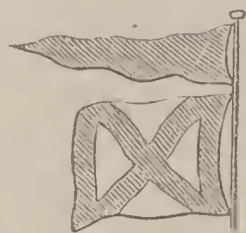
27 feet.



27 ft. 10 in.



28 ft. 8 in.



Tide rising.



High water



Tide falling.

In addition to the established storm-warning (exhibition of a black cylinder,) the following system of weather-signals^{Weather-signals.} was adopted in 1870, for the principal ports and shipping places on the coast of France.

1. A flag of any color indicates: weather doubtful, barometer inclined to fall.

2. A short pennant, (cornet): appearance of bad weather, heavy sea, barometer falling.

3. A pennant: appearance of better weather, barometer rising.

4. A ball above cornet: entrance of the port has become dangerous; be careful.

5. A ball below cornet: the life-boat is coming out.

The pilots for the different ports on the coast are under the orders and supervision of a chief pilot. All vessels above 80 tons burden are obliged to take one, but in many ports a reduction is made in the charges for steamers. Pilots.

All vessels requiring a pilot in the daytime will make use of the following signals, either separately or together: Pilot-signals.

1. The jack, or national flag, having round it a white border one-fifth the breadth of the flag, to be hoisted at the fore.

2. The international-pilotage signal, indicated by P. T. in the United States edition of that code.

At night the following are to be used:

1. Pyrotechnic light, commonly known as a blue light, every fifteen *minutes*.

3. A bright *white* light, shown at intervals of fifteen seconds, just above the bulwarks, for about a minute at a time.*

In reply, the pilots will repeat the signal in the same manner with the *white* light, which they are required, by a previous decree, to show every 15 minutes.

When, from stress of weather, or other cause, it is impossible to board a ship, piloting signals are made in many ports to guide vessels in. They are given in the body of this work, under directions for entering the Adour river;

* The master of a vessel is bound to see that no person under his command shall display any of these signals on other occasions than those permitted by these ordinances.

being the same wherever used at all on the coast, they need not be repeated.

Distress-sig-
nals.

In the day-time the following distress-signals will be used, either separately or together :

1. A gun fired at intervals of about 1 minute.
2. The international code signal of distress indicated by N. C. in the United States edition of that code.
3. The distant signal, consisting of a square flag having, either above it or below it, a ball or anything resembling a ball.

At night the following will be used :

1. A gun fired at intervals of about 1 minute.
2. Flames on the ship, (as from a burning tar-barrel, oil-barrel, &c.)
3. Rockets or shells of any color or description fired one at a time at short intervals.

Signal and tele-
graph stations.

The Postes électro-sémaphoriques of the French coast have been established at all points from which vessels can be most easily seen in the offing. Unfortunately their position has not in all cases been selected with a view to enable vessels to see their signals.

The stations consist of a one-story house surmounted by a mast about 35 feet high, fitted with three arms, one above the other, and each one of which has a disk at the extremity. The arms revolve in a vertical plane round their hinge on the mast, and the latter pivots on its base so as to present the whole system squarely to the vessel, or other station, receiving the message.

The buildings are recognizable from a distance by their regular shape; they are generally painted either white or yellow, with a black mast; they use the International Code of Signals, and on the approach of a vessel they make the number of the port or point by that code. The one mast serves to display all the flags used in signaling, but a message can sometimes be repeated to other stations more quickly by the arms than by the combinations of flags.

All the stations have a wire to the nearest general telegraph-office; they are under the supervision of captains of the French navy, excepting so far as the care of the electric apparatus is concerned. A ship-master can send a message

to almost any part of the world by signaling with the International Code.

On the French coast, in entering a harbor, all buoys and beacons painted red must be left to starboard, and those painted black to port. The beacons below the level of high water, and all warping-buoys, are painted white. The small rocky heads in frequented channels are painted in the same manner as the beacons when they have a sufficiently conspicuous surface. Buoys or beacons painted in black and red stripes may be passed either to starboard or to port.

Each beacon or buoy has upon it in full length or in abbreviation the name of the danger it marks, also the number showing its numerical order in the same channel. These numbers commence from seaward; the even ones on the red buoys, and the odd on the black. The letters and numbers are painted in white on the most prominent parts of the buoys, and are from 10 to 12 inches in length. The masts of the beacons which do not present sufficient surface are surmounted for this purpose by a small board. All jetty heads and turrets are colored above the half-tide level, and on the former a scale of metres (1 metre = 3.2809 English feet) is marked commencing from the same level, except where the contrary is specially stated in the body of this work.

In navigating among the channels of a coast at night, however well it may be lighted, there is considerable inconvenience and some danger in the exclusive use of the compass. Besides having to make a different correction for local deviation for every course steered, there are the usual difficulties in illuminating the azimuth-compass card without blinding the observer; and it may frequently happen that some object (especially boats in a man-of-war) may screen the light as its bearing is about to be taken. Also, if there be much sea running, and the ship roll or pitch so as to disturb the compass, whether it be sluggish or lively, the observation cannot be very close.

For these reasons there has been an attempt made to introduce the sextant as an aid to the pilot on the coast of France, and in several places it has met with considerable success, having been tried by captains of merchant-vessels as well as of men-of-war. The result aimed at is to make a

ship describe an arc of a circle in clear water, instead of a simple straight course, by bringing and keeping two lights at the same angle apart. Clamping the instrument beforehand at an angle corresponding to the arc giving a route clear of dangers, and bringing the vessel on that arc, she may be kept on it as accurately as on the range of two lights ahead or astern. A little practice will make the operation quite easy.

When the reflected light coincides with the one seen directly in the horizon-glass, the fact of their opening a little shows that the vessel is leaving the arc, running either outside or inside of it, and the course must be changed to keep her on it. It is only necessary to use small helm, and keep in mind the following rules, which, once mastered, are as simple as those for keeping two lights in line.

1. Taking the case of a vessel heading in the direction of the light that is seen directly with the reflected one to the *right* of it: if the latter open to the *right* of the former, the angle is increasing, and the vessel should go to port; if it open to the *left*, the angle is decreasing and she must go to starboard.

2. In case of heading in the direction of the light seen directly, with the reflected one to the *left* of it: if the latter open to the *left* of it, the ship should go to starboard; if it open to the *right* of it, she should go to port.

In case of having to reflect the one nearest the ship's head, from the other being feeble, or from any cause, these rules are reversed.

3. Steering away from the light seen directly, with the reflected one to the *left* of it: if the latter open to the *left*, the vessel must go to port; if it open to the *right*, she must go to starboard.

4. Steering away from the light seen directly, with the reflected one to the *right* of it: if the latter open to the *right*, the ship should go to starboard; if it open to the *left*, she should go to port.

Steamers alone can adopt this system of navigation at all times; sailing-vessels making the circular course may frequently bring the wind ahead. But they can sometimes perform the evolution; for instance, entering Benodet bay, it can be done when the wind is in the SW., and those winds are very frequent there.

Vessels can find a lee under Penfret island, (of Les Glénans group,) Ile de Groix or Belle-Ile during heavy westerly or southwesterly weather. If caught by a southerly gale to the westward of Penmarc'h, it is not advisable to try to weather that point, if the sea be running high, as the surface current sometimes runs 2 knots an hour to leeward; it would be better to stand out to sea or run for Douarnenez bay, doubling the Chaussée de Sein, or passing through the Raz, as circumstances of tide and weather may dictate. The great natural advantages of Brest roadstead as a port of refuge have long been recognized.

South of Belle-Ile small vessels can run into Le Croisic for shelter from west or southwest winds, but should be careful to avoid entering the Vilaine or Loire rivers. La Chaise anchorage in Bourgneuf bay would be preferable to either of the latter.

During a northwesterly storm, a ship could scarcely hold on in Ile de Groix or Belle-Ile anchorages, nor would that of La Chaise be desirable, but a ship could put into Benodet bay, Port Louis roads, Quiberon bay or the Loire.

During the winter southeast gales are frequent, and on the approach of one it would be advisable to make a lee under Belle-Ile, or in Quiberon or Bourgneuf bays.

South of the Loire river, the Pertuis are, in all weathers, the best ports of refuge. In case of heavy westerly weather it is best to make the Pertuis d'Antioche, as the bar of the Pertuis Breton (9 fathoms) breaks under those circumstances during a strong ebb-tide. Pallice anchorage would be found a snug berth, and next to it that of Aix island. If driven into the Pertuis Breton, however, Pallice anchorage could be made; a vessel dismantled could drive into Aiguillon bay and ground in the mud without injury. If in the vicinity of Ile d'Yeu, a ship could hold on well under Corbeaux point, abreast La Conche bay.

Along the coast of Les Landes, what few little harbors there are cannot be entered by vessels of any size during westerly gales. At the head of the gulf safety can be found at the mooring-buoys in Saint-Jean de Luz bay, since the construction of the breakwaters at the entrance, but if to windward of the port of Pasages it would be well to run in there.

CHAPTER VII.

THE BIDASOA RIVER TO THE GIRONDE RIVER.

Variation in 1876.—Bayonne, $18^{\circ} 05'$ westerly; Bassin d'Arcachon, 18° westerly.

The first headland E. of the mouth of the Bidasoa river, the boundary for some distance inland between France and Spain, is point Sainte-Anne. (See Chapter V.)

Coast.

From point Sainte-Anne the coast-line runs ENE. $\frac{3}{4}$ E. 3 miles, to the western point of the bay of Saint-Jean de Luz, which is recognizable by the castle of Socoa. This sloping and rocky coast is fringed with reefs the whole length, and is less high than that of the adjacent province of Guipúzcoa. From seaward, before the shore is visible, high land can be seen in the interior extending to the westward. This is the Pyreneean range.

Bank of Saint-Jean de Luz.

Before speaking of Saint Jean de Luz bay, some details will be given of the plateau of the same name, which extends from 4 to 5 miles to seaward of the coast between Fuenterrabia bay and the entrance to the Adour river. A vessel has nothing to fear in crossing this bank in smooth weather, the least depth being 6 fathoms, ranging from that to 35 fathoms; but in bad weather the sea breaks heavily on the shallow patches, and the shore should not be approached too close. The bottom is generally rocky, with here and there patches of sand and occasional gravel. The general limits of the bank are as follows: In the SW. the first shoal spot is Belhara-Perdun, $1\frac{1}{6}$ miles from the coast, two-thirds way between point Sainte-Anne and Socoa. By keeping the summit of mount Jaisquivel open to the northward of cape Higuera a vessel will be clear of all danger. The northeastern limit is found by bringing the old signal-tower, on the southern shore of the entrance to the Adour, in line with the flag-staff of Le Boucaut.

Principal shoals.

The bank of Saint-Jean de Luz has eleven principal

heads that break in rough weather. They are as follows, commencing with the southwesternmost:

Belhara-Perdun, which extends two-thirds of a mile east and west, is found by bringing the steeple of Saint-Jean de Luz over the fort of the jetty of Socoa, or the summit of mount Esnaou over the house of the fort of Socoa, and the town of Fuenterrabia well open of point Sainte-Anne, or Le Tombeau, as it is called on some old charts. The least water on it is $7\frac{2}{3}$ fathoms. A vessel is clear, to the northwestward, so long as the old fort of Hendaye is open of point Sainte-Anne. A vessel is inside, to the southward, when the church-steeple of Saint-Jean de Luz is seen through the cut between the fort of Socoa and the coast.

Belhara - Per -
dun.

Aroca-Tiquia is a small shoal, with $9\frac{1}{4}$ fathoms on it. The marks are, the steeple of Saint-Jean de Luz over point Sainte-Barbe, and the summit of mount Cambo over the inlet of Guethary. It breaks at the same time as Belhara-Perdun. To go outside of it, keep Saint-Jean de Luz open to the westward of Sainte-Barbe point.

Aroca-Tiquia.

The soundings on Ficoa-en-Cala give a least depth of $10\frac{1}{2}$ fathoms, and immediately around it are 16 and 18 fathoms. The marks are, the steeple of Saint-Jean de Luz over point Sainte-Barbe, mount Cambo and the steeple of Guethary in line, and the clock-tower of Fuenterrabia touching the outer rock off point Sainte-Anne.

Ficoa-en-Cala.

Illarguita-hour-Handia is a large bank, $1\frac{1}{4}$ miles long, north and south, and three-fourths of a mile broad, east and west, with 12 fathoms water on it. The marks are, mount La Batallera, or La Couronnée, over the hermitage of Saint-Martial, the tower of Socoa touching Bourdagain on its left, and the summit of mount Cambo open to the right of Guethary.

Illarguita-hour-
Handia.

Campo-Banco is circular in shape, with a diameter of one-half mile. The shoalest spot, covered by $10\frac{1}{2}$ fathoms of water, is found by the tower of Bourdagain well open to the westward of point Sainte-Barbe, the church of Fuenterrabia just open of Sainte-Anne point, and the summit of Cambo, also called Ursuia, or Mendi-Handia, a little open to the right of Bidart.

Campo-Banco.

Placeta-hour-Choumiac, commonly called simply Placeta, is a large bank, $1\frac{2}{3}$ miles long, NE. and SW.; the south-

Placeta - hour
Choumiac.

ern part is five-sixths of a mile broad, SE. and NW. Least depth $11\frac{1}{2}$ fathoms. Bearings for the centre, mount La Rhune well on with point Sainte-Barbe, and the top of Mendi-Choumiac beginning to appear above the Maison Etehe Handia of Bidart.

Herreca-hour-
Choumiac.

The sea rarely breaks on Herreca-hour-Choumiac, commonly called Herreca, there being $14\frac{3}{4}$ fathoms on the shoalest spot, the bearings for which are Saint-Martial (hermitage) to the right of the highest peak of mount Batallera; the summit of mount La Rhune between the steeples of Siboure and Saint-Jean de Luz, a little nearer to the latter than to the former. A vessel will remain clear of this shelf, and consequently of the whole bank, it being on the seaward edge, by keeping Amuck island on with mount Jaisquivel.

Esclabotac, or
Basse des Es-
claves.

Esclabotac has only $6\frac{1}{4}$ fathoms on it, and is consequently the first to break. Its bearings are the tower of Bourdagain, barely open of point Sainte-Barbe, and the old villa Eugénie (the late emperor's palace) just open to the northward of the big rock at Biarritz.

Grande Aro-
quiague.

The least water on the Grande Aroquiague is $9\frac{1}{4}$ fathoms, but directly inshore of it, $1\frac{1}{2}$ cables from the edge, is a shoal of $8\frac{3}{4}$ fathoms. Bearings of the former are: Guethary au Sud in line with the easternmost slope of La Rhune, and the tower of Bourdagain open of point Sainte-Barbe, S. 25° W.

Chouroubiague.

Chouroubiague is an extremely dangerous place, although covered by $12\frac{1}{2}$ fathoms of water, and is greatly feared by the pilots. The tremendous sea often found on it is caused by the abrupt change of depth. When there is a high sea running, the breakers join those on the Grande Aroquiague and the Basse des Esclaves. The land-marks are Guethary, a little to the eastward of the top of mount La Rhune, and the top of mount Cambo, a little to the southward of the rocks of Biarritz.

Loutrou.

Loutrou, on which there is a depth of 6 fathoms, breaks heavily with the sea from the west. Bearings of shoalest spot: Mount La Rhune open to the westward of Boucaleau rock or Biarritz, and the signal tower of the Adour N. 70° E. There is on Loutrou bank another rock, NW. $1\frac{1}{2}$ cables from the first, with $6\frac{1}{4}$ fathoms on it.

If, with a NW. wind, the sea break on Loutrou and the Basse des Esclaves, without there being any disturbance on the other ledges, a vessel can hold a safe course inside the bank by keeping mount Batallera moderately open to the westward of point Sainte-Barbe, until abreast of Bidart. Then keep mount Jaisquivel just open of point Sainte-Anne, steering S. 60° W. until off Saint-Jean de Luz, when follow directions for entering the bay.

Pass inshore of the bank.

In case of a heavy sea a vessel may pass between Herreca and Illarguita, keeping mount La Rhune over the clock-tower of Siboure, S. 17° E. When point Sainte-Anne shuts in the steeple of Fuenterrabia, look for landmarks on the starboard bow.

Herreca pass.

Illarguita pass is between Illarguita and Belhara-Perdun. It is the one generally taken by the pilots going to Saint-Jean de Luz when the wind is in the W. or NW. and the sea heavy. Steer for Socoa light, bearing S. 40° E.

Illarguita pass.

The pass to the southward of Belhara-Perdun may be taken with the wind from the westward or southwestward, if the sea be smooth. The steeple of Saint-Jean de Luz, visible through the cut between the fort of Socoa and the point, leads in clear to the southward of Belhara-Perdun. If this shoal give signs of breaking, bring the steeple behind the point and steer for Socoa light S. 72° E., until the two light-houses on Sainte-Barbe point come in line S. 79° E.

Pass to the southward of Belhara-Perdun.

The bay of Saint-Jean de Luz was noted, not long since, as much for its miserable qualities as a port of refuge as for its natural beauty. The latter is indeed remarkable, but the tremendous sea that sometimes rolled in, destroyed all the piers that had been commenced. Early in the century, forty vessels were lost in the bay during a single gale, and a gunboat riding it out at anchor under the lee of the Artha rock, capsized. Not only did mariners fear the place, but the inhabitants even of the town looked forward with dread to the time when the constant wearing of the beach would bring about the destruction of their homes. The construction, although not yet completed, of the break-water of Socoa and of that of Artha, has entirely allayed the latter apprehensions, and the fact of several large ships having ridden out gales of wind at anchor, in which, a few

Saint-Jean de Luz bay.

years before, they would inevitably have gone to pieces, shows certainly that the nautical improvement is great. The bay is now the refuge of vessels that cannot enter the Adour, and the importance of the town will, in all probability, increase with the advancement of the works.

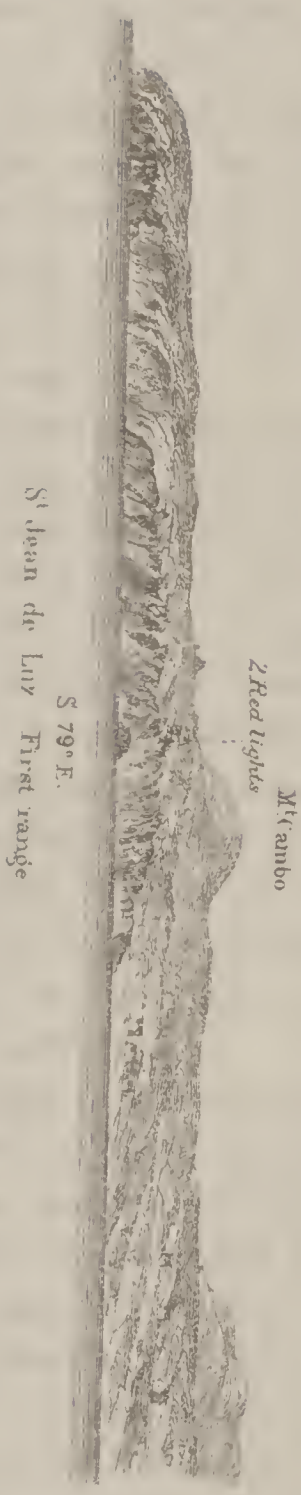
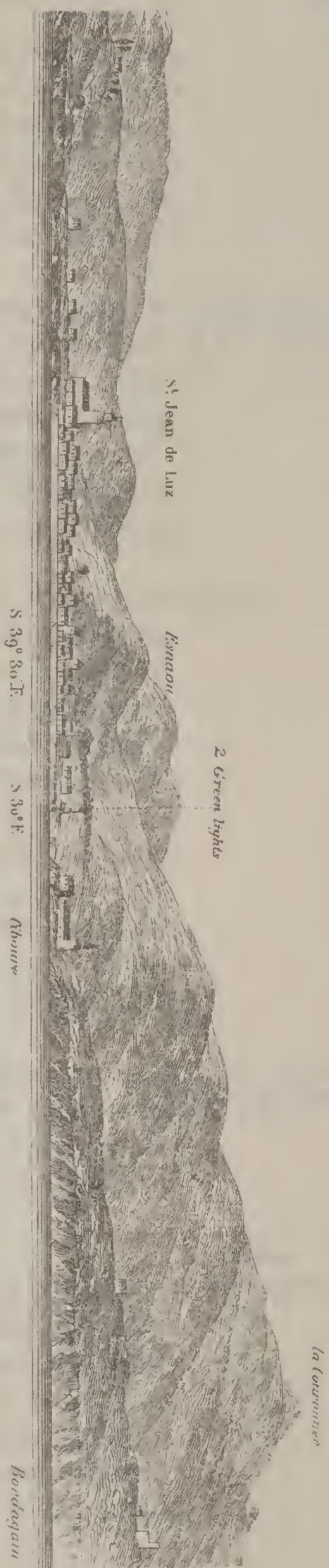
The bay is five-sixths mile wide in its broadest part, and one-half mile deep, measuring from the line of the break-water. It affords anchorage in 3 to 6 fathoms water. The stone jetty in course of construction at Socoa will extend from the fort, about 500 yards to the eastward, toward the Artha rock, leaving an entrance of about 280 yards' width. It is twenty feet above the sea. On Artha another break-water is building which will extend from the western edge of the shoal across it, 300 yards to the eastward, toward point Sainte-Barbe.

River Nivelle The river Nivelle falls into the head of the bay, between two quays 30 yards apart, and at its mouth on the right bank is the town of Saint-Jean de Luz, which is connected with its suburb, Siboure, on the left bank, by a bridge. The bar at the entrance dries 2 feet at springs, at which period there are not more than 3 feet of water between the quays. But even then a vessel can remain afloat in a hole below the bridge. When much of a sea rolls into the bay, it is difficult to cross the bar even at high water, as it is apt to break.

Leading lights. At the extremity of the jetty on the eastern bank of the river is an iron post, 14 feet high, from which is shown a *fixed green* catoptric light, 19 feet above sea level, and visible 3 miles through an arc of 26° . S. 30° E., 494 yards from this, is a *similar* light, 52 feet above the sea, and visible 7 miles through an arc of 20° . The latter is shown from a stone tower in Siboure. The two in line lead into the bay.

Point [Sainte-Barbe. Sainte-Barbe point is the eastern extreme of the bay. It is a bluff of regular height, crowned by a battery, and on the rocks off the extremity is a landing. These rocks extend 1 cable to the westward, and nearly 2 cables south from the point, and uncover at low water, making a close approach to this side of the entrance dangerous.

Les Esquilletac. North of point Sainte-Barbe are two patches of 3 and 4 fathoms, the nearest being $4\frac{1}{2}$ and the outer one 7 cables



from it. The depth immediately outside to the northwestward is 8 fathoms. Large vessels should never attempt to pass inshore of them. In a heavy sea, the breakers join those of the coast. The summit of the outer spot brings the steeple of Saint-Jean de Luz just shut in by Sainte-Barbe point, and the village of Guethary well open to the northward of point Chibo, bearing N. 78° E.

On point Sainte-Barbe are 2 *fixed red* lights, bearing S. 79° E., and N. 79° W. from each other, 416 yards apart. The one on the end of the point is 95 feet above sea level. The other is 141 feet above the sea, and visible 8 miles. They are both visible over an arc of 13° on either side of the bearing, S. 79° E., and when in line lead into the harbor until the *green* harbor-lights are in line, which must then be kept so.

The western point of the bay is also rocky. On it are situated the town and fort of Socoa. Inside is a little tidal harbor, protected by piers. With a smooth sea and NW. wind it will admit vessels of $13\frac{1}{2}$ feet draught at springs, and $10\frac{1}{2}$ at neaps. Unless the sea be very heavy, vessels can run in there for shelter that may not have been able to cross the bar of Bayonne. The state of the tide should be considered, as it is necessary to avoid being at the entrance before half-tide. The pilot boats can leave at quarter-tide. If the wind be from the west at the time of entering, lines can be sent to the southwestern pier, to haul in by. There is a bell at the end of this pier, to facilitate finding it in foggy weather.

On Socoa point is a square tower, 33 feet high, painted *white*, with a *black* vertical stripe on each outer face, from which is shown, 115 feet above high water, a *fixed white* light, with a *red* sector toward the harbor. It is a dioptric light, of the 4th order, visible 10 miles.

A life-boat is stationed on the point.

There is a semaphore signal station between the light-tower and the fort. The building is yellow, and the mast black. Geographical number B. G. R. L. A red flag indicates that a vessel in sight should wait until at least half-tide before attempting to enter. When that red flag is hauled down, and a tri-colored displayed, the vessel should head in, observing the movements of the flag, and chang-

Lights: Lat. $43^{\circ} 24'$ N.; long. $1^{\circ} 40'$ W. N. light.

Socoa.

Light: Lat. $43^{\circ} 23' 43''$ N.; long. $1^{\circ} 41' 21''$ W.

Life-boat.

Signal station.

ing course to whichever side it inclines, steadying the helm again as the flag is brought back to a perpendicular. As the vessel advances into the bay, a flag, also tri-colored, on the southern pier-head, will take the place of the one on the tower, and its movements should be obeyed in the same way. This flag will take vessels to the anchorage, and hauling it down is the signal to come-to.

Pilot-signals. Asking for a pilot, and sending or refusing to send one, are done by the same signals as are used for the tug-boat off the Adour.

Artha rock. Nearly midway between Sainte-Barbe point and Socoa, (a trifle nearer to the former,) is the Artha rock, on which the sea often breaks, there being but 21 feet on it at low water. The breakwater building there will extend from the western edge across it, to a safe depth to the eastward.

Bank of Mabessin. At a distance of one-half mile N. $\frac{3}{4}$ E. from Socoa light is a shoal, called the bank of Mabessin, which has $4\frac{1}{2}$ fathoms on it. This breaks, of course, when the sea is rough.

Directions. A vessel's position may be obtained, except in thick weather, by the two mountains, La Rhune and La Batalera. The first bears SSE. $5\frac{3}{4}$ miles, and the second SW. $\frac{3}{4}$ S. 8 miles from fort Socoa.

Coming from the westward, if there be not much sea on, a vessel can come to the southward of Belhara-Perdun, keeping not less than half a mile from the coast of Socoa. Coming from the northward, in smooth weather, the harbor may be approached by bringing the clock-tower of Siboure to bear S. 30° E., and steering for it until the square, crenelated tower of the inner light of Siboure is made. Bring this on the same bearing, and keep it so. The smaller light on the east bank of the Nivelle will soon after be made in line with it. After passing the jetties of Socoa, port the helm handsomely, and bring an old ruined mill,* on an eminence on the right, in line with the Maison Marie-Bernaténia, which is half-way up the hill. This range leads to the mooring-buoys.

* As an old ruined mill is apt to be torn down or blown away, it is best not to rely upon finding it. The buoys can generally be seen far enough to enable a vessel to steer for them immediately upon entering the bay. At all events, the signal-station at Socoa will give captains all necessary guidance during the day-time.

In case there be a heavy sea running, a vessel should not steer S. 30° E. for the entrance, because of the banks of Illarguita and Mabessin, which break. Herreca pass or Illarguita pass may be taken. The latter is generally taken in heavy westerly weather. When the two light-houses on Sainte-Barbe point are in line, steer for them until mount Esnaou is seen between two national ensigns in Saint-Jean de Luz, or the two lights of the Nivelle come in line, then head in. In rough weather.

At night, with a heavy sea and westerly wind, pass to the eastward of Belhara-Perdun, by keeping Socoa light S. 41° E.; on this course bring the two lights on Sainte-Barbe point in one; keep this alignment until the two *green* lights in Saint-Jean de Luz and Siboure are in line, when steer for them until Socoa light shows *red*. Port the helm and stand in, about S. by W. $\frac{1}{2}$ W., for the anchorage, where Socoa light again shows *white*. If the sea be smooth a vessel in the offing may simply bring the *green* lights in one, and stand in. The larger of the lights being visible 7 miles, and the smaller only 3, the former will be made first; but by keeping that one on the bearing S. 30° E., the other will soon be made in line with it. At night.

In case of a southerly wind, a sailing-vessel seeking smoother water under the land should not come nearer than 1 mile from the breakers. With a west wind, small vessels pass to the eastward of Artha, but they must be careful to give a good berth to the rocks extending from Sainte-Barbe point. Sailing-vessels.

It should be borne in mind that a breeze, fresh in the offing, frequently fails entirely on approaching the bay, in which case a vessel, unaided by steam, is apt to be drifted on Mabessin. Caution.

The usual anchorage is midway between fort Socoa and the mouth of the Nivelle, in 3 and 4 fathoms water. The bottom is rock, covered with sand and mud. The rocks are in ledges, inclined 60° to the horizon, and running about ENE. and WSW., and would certainly cut through any other than chain-cables. In mooring, if the buoys be not taken, let go the starboard anchor first, to the northward, and sheer over to southwestward to drop the port. Anchorage.

Mooring-buoys. There are two mooring-buoys in the anchorage, and they should always be used if possible. Coming in in bad weather, it is advisable to drop two anchors, send hawsers to one of the buoys, and then send a spring to a third buoy off the quarter, to keep the ship's head to the NW. against the ebb-tide.

Tides. In Saint-Jean de Luz bay it is high water, full and change, at 3^h 45^m. Springs rise 12 $\frac{1}{4}$ feet; neaps 8 feet. The flood, entering on both sides of Artha, often produces a rotary

Currents. motion in the waters of the bay. During the ebb the current of the Nivelle is strong enough to make vessels swing against the wind, or at least to make them ride in the trough of the sea.

Town. The town of Saint-Jean de Luz has never been one of importance, because of the impracticability of the bay. Its population is about 4,000 now, but after the completion of the breakwater it will probably increase with the trade. The latter is still small. A few vessels sail annually for Newfoundland and other fisheries.

Coast. About 1 mile ENE. from Sainte-Barbe point the coast diminishes in height and runs to the northeastward. It is extremely indented, and, as far as Saint-Martin point, consists in general of low rocks, with here and there a short beach; but the country inland is high.

Bidart. At a distance of 4 miles from point Sainte-Barbe, the village of Bidart may be discerned on a gentle declivity, about 1,000 yards from a small stream. Here the decrease in height of the coast is quite noticeable.

Biarritz point. The coast then trends more to the northward, and 2 $\frac{5}{8}$ miles from Bidart is Biarritz point, which juts well out from the coast. On the point and in its vicinity are a number of buildings, principally hospitals and hotels, the resort of those that bathe on the beach of Biarritz, just north of the point. On the southern extremity of this beach is the palace built by the late Emperor.

Signal-station. The building of the semaphore signal-station, which is on the top of the cliff, is painted white. The geographical number is B. G. R. J.

Anchorage. There are two anchorages off Biarritz point—the *port neuf*, formed by jetties built out from the point on which is the semaphore, and the *port des barques*. To approach the



La Rhune

La Couronné

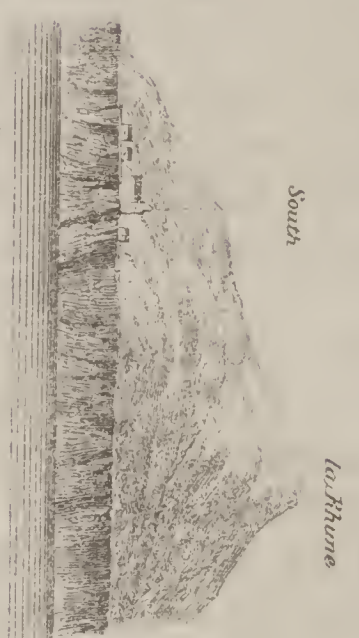
Cap Higuier

View from abreast the Adour.



La Couronné

St Martial



South

la Rhune

Guehary



St. E. Combo

Guehary

former, run in for the semaphore SSE., pass close to the end of the northern pier, and anchor inside. With the wind fresh from the westward the swell is such that vessels are obliged to put to sea. Steamers can land their passengers here at any stage of the tide, which is impossible at any other point between Saint-Jean de Luz and Arcachon.

The *port des barques*, situated to the eastward of the *port neuf*, is under the lee of the Atalaya,* notwithstanding which the surf is sometimes so heavy that vessels have to be hauled up. The whole harbor dries at low water. There is a basin communicating with the harbor, and closed by a gate in stormy weather. In this basin most of the work for the jetties was done.

Until a few years ago vessels used to anchor 1 mile off shore, with the village bearing ESE., on a bed of sand extending from Bidart to off the mouth of the Adour. The holding-ground there is good, but a wind from the westward soon raises a heavy sea. A French squadron anchored there in 1867, in 8 fathoms water, with mount Batallera open of point Sainte-Barbe one-third the interval between the latter and Socoa.

Saint-Martin point, 1 mile NE. of Biarritz, is high and round. Saint-Martin point.

On it is a circular white tower, with enlarged base, 144 feet in height. Exhibited from it, 240 feet above the sea-level, and visible 22 miles, is a *fixed* dioptric light of the first order, alternating *red* and *white* every 20 seconds. This is known as the Biarritz light. Biarritz light:
Lat. 43° 29' 38" N.
long. 1° 33' 22" W:

There is a life-saving station on the point.

Life-saving station.
Coast.

From Saint-Martin point the nature of the coast changes. It consists of beaches and low sand-hills, and runs 2½ miles in a north-northeasterly direction, to the mouth of the Adour.

The Adour river rises in the mountains of Tourmalet, in the department of the Hautes Pyrenées, and flowing first to the northward, and then to the westward and southwestward, empties itself into the bay of Biscay, 200 miles from its source. On its banks are the towns of Dax, Saint-Lever, and Bayonne. The current is rapid, and serious inundations are caused by the melting of the snow on the

Adour river.

* Atalaya signifies any elevation from which a considerable view can be obtained. In this instance it is also a lookout station.

mountains. Timber is brought down the stream from the Pyrenees, and tar, pitch, resin, cork, grain, and brandy from Armagnac.

Bar.

The river flowing into the sea against the direction of the prevalent winds caused the bar to shift and the depths to vary continually, before the building of jetties inclosing the channel. They were originally constructed of wood, 170 yards apart, and extended out to the range of La Rhune mountain and Biarritz steeple, about 500 yards outside low-water mark. But in 1875 they had been carried out 92 yards beyond that range, and built of iron piles, filled in with rock and concrete. The improvement has been evident. Previous to this extension, after a protracted blow from the northward and westward, as small a depth as 3 feet had been observed in the channel, whereas since then the least has been 6 feet, and there has been no shifting of the bar.

At high-water springs there are generally 18 feet, and at neaps 15. As much as 21 feet has been observed.

The bar is passable, by sailing-vessels, only during the daytime, and during the flood-tide or beginning of the ebb. Even with plenty of water, a vessel is often prevented crossing by the heavy sea caused by the ebb-tide. The sea is sometimes smooth in the offing when the bar is impassable.

Light: Lat. $43^{\circ} 31' 46''$ N.; long. $1^{\circ} 31' 23''$ W.

A *fixed* dioptric light of the fourth order is exhibited from a circular signal-tower near the end of the southern jetty. This light, 56 feet above the sea, and visible 6 miles, shows *white* when the channel is practicable, and *red* when the reverse is the case.

Life-saving station.

There is a life-saving station here.

Leading-lights.

There are two *green* leading-lights also, which, kept in line, lead through the channel between the jetties. These are only exhibited when the light at the entrance shows *white*.

Tides.

It is high water, full and change, on the bar of the Adour, at $3^h 45^m$. Mean spring rise, 12 feet; neap, $10\frac{3}{4}$ feet.

Tidal currents.

The ebb-stream, strengthened by the current of the river, occasionally attains a speed of 5 knots, abreast of the old signal-tower, at the inner end of the southern jetty. The flood rarely runs faster than 3 knots, and sometimes is re-

tarded and even prevented entering at all, when the river is swollen. The *Annuaire des Marées* gives for every day the hour and height of high water at Boucaut, ($1\frac{1}{2}$ miles from the mouth.) These heights differ but little from those at the bar or Bayonne.

A vessel bound in for the Adour should keep to the northward of the entrance if the wind has been northerly or northeasterly for several days, and to the southward if it has been anywhere between SE. and WNW. It is to be borne in mind that in the latter case there will be a stronger current than usual to the northeastward, as the wind will have been assisting Rennell's current, which runs in that direction. If there be a fresh breeze from the southward it is best for sailing-vessels to lie off and on, keeping not far from the coast of Spain, and endeavor to keep in such position as would admit of reaching Port of Pasages, or at least Saint-Jean de Luz, in case the wind should haul to the SW. If the barometer be low, this becomes a necessary act of prudence, because a south wind will shift to SW. and W., with a very heavy sea, and the entrance to the Adour becomes impracticable for several days. If the wind be in the westward, and the weather promise fair, stand to the northward two hours, and tack and stand to the southward for three hours, to counteract the effect of the current and keep in good position before the mouth of the river.

Inshore of the general current to the northeastward, there is often found, with a NW. wind, a counter-current extending generally about half a mile from the coast, and running to the southward. This is due to the change of waves of undulation to waves of motion, effected by the inclination of the former to the direction of the general line of the shore. After a long continuance of north-northwesterly winds, this counter-current will extend for some distance out, and weed, &c., from the basin of Arcachon, may be met on the bank of Saint-Jean de Luz.

A vessel waiting to enter the river, can anchor outside the bar in 12 to 15 fathoms water, sand and mud, NW. 1 mile from the entrance.

Outside this anchorage are some rocks, known as the Roches de la barre. They rarely break, being but little

above the general bed. The southeastern limit of these rocks is in line with mount La Rhune and Guethary. The anchorage can only be considered temporary, and a vessel should put to sea at the first indications of bad weather, unless certain of getting in soon.

Signals.

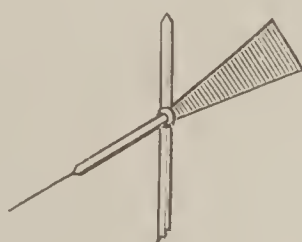
Vessels are informed that the bar is practicable by signals made at the station.* When the chief pilot judges that the bar will be practicable at high water, he will show the national flag from the signal-staff, indicating with black balls the greatest draught of water he thinks will be admissible at high water. Vessels whose draught does not exceed that indicated may then approach, but not nearer than 1 mile. If the entrance should not be tried, no flag will be hoisted, and if a vessel were to approach, warning-signal No. 6 would be made from the tower.

From the tower are made two classes of signals—those for draught, and those for piloting. The former, made with disks, indicate what draught can be carried over the bar at the moment the signal is made. Vessels drawing more should keep off until higher water.

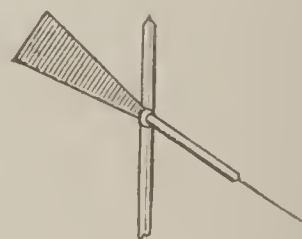
Vessels that can enter should maintain such distance apart as will prevent two being in the breakers at the same time. The first comer will obey the following signals :†



No. 1. Vessel is seen.
Pilot will guide it.



No. 3. Go to starboard.
(Port helm.)



No. 4. Go to port.
(Starboard helm.)

* A captain in Saint-Jean de Luz can ascertain from Bayonne by means of the semaphore telegraph, if he should leave the anchorage and try the entrance to the Adour.

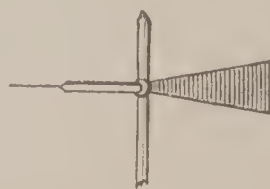
† The following numbering is kept, being the same as that in the instructions in the possession of many captains, so as to avoid all possibility of error.

The arm raised to a vertical position after No. 5, indicates that the next vessel will be guided.

In case two or more vessels should be outside the bar at the same time, one coming from the northward and one from the southward, if signals to one might put the other in danger, none will be made. Ships will then haul their wind, and the arm will be raised as soon as there is no longer any danger of confusion.



No. 5. Danger is passed.



No. 6. There is not enough water. Stand off.



No. 7. Warning a vessel that she will be put ashore.

If at any time it should be deemed expedient for a vessel to stand off, from any cause whatever, No. 6 will be made, lashing a ball to the smaller end of the arm.

If the only chance of saving a ship's company be to run the vessel ashore, a red flag will be lashed to the smaller end of the arm, and will be worked to guide a vessel to the best place for beaching. If the captain consent to lose the ship, being forewarned, he can make preparations for saving life.

If, after signaling for vessels to approach, the chief pilot think best for vessels of 50 tons or less to stand off, a black cross will be shown against the seaward face of the tower, the signals for approaching being kept flying.

If no vessel should attempt to enter, the signals will be hauled down, and a red flag displayed from the flag-staff on the tower, the arm remaining in position No. 6. Vessels should then either put to sea or try to make some port to the southward.

There is a tug at Boucaut, and captains wishing to employ it will show their national flag at the main. To prevent any confusion that might otherwise arise, a vessel asking to be towed will haul down the flag as soon as answered, and

Tug.

hoist it again immediately, keeping it flying until the tug gets alongside.

If the tug can go out, a white flag with blue trefoils will be hoisted at the yard-arm of the signal-staff. This flag is also an order to the tug-boat to get up steam. If the tug cannot go out, two white flags with blue trefoils will be shown. Three such flags, hoisted one above the other at the yard-arm of the signal-staff, indicates to vessels outside that they must take a tug, without which they cannot enter. Acceptance is indicated by the national flag at the main. When the vessels have answered in that way the three flags will be hauled down, and one hoisted as an order to the tug.

Leaving in day-time.

A flag with red and white squares displayed from one of the inshore angles of the tower, indicates that steamers and sailing-vessels, towed if necessary, can go out. A flag with blue trefoils indicates that steamers alone can do so. These signals are repeated at Boucaut and Bayonne.

Entering at night.

It is forbidden for sailing-vessels to enter at night unless towed by the harbor-tug. Steamers can sometimes enter, in which case the light on the end of the southern jetty shows *white*, and the two *green* leading lights will be exhibited. There are no means of signaling the depth on the bar at night, so that a prudent captain will not often risk the attempt.

Leaving at night.

The same range lights that take a vessel in will take her out. Captains should always consult beforehand with the chief pilot.

Caution.

Vessels should not skirt the coast too closely when approaching the entrance. When off the mouth, with mount La Rhune open to the westward of Biarritz light, it will be safe to head in.

Caution.

If the stream be swollen so as to prevent the flood-tide entering, it is best not to attempt to pass the bar, as the current of the river would make it much more difficult. However, if there be a fresh breeze, and if warning-signals do not forbid, it may be tried; but as much sail as possible should be carried.

River.

With the wind aft, the head sails should be up, with the sheets flat aft, in case the vessel should broach-to.

After vessels have passed the tower, there are pilots to take them up to the anchorage at Boucaut or Bayonne.

The navigation of the river is not difficult; hug the northern bank from the tower to abreast Le Lazaret, which is on the southern bank. Then cross the river very diagonally, just avoiding the Casquets reef, the two up-stream heads of which are indicated by beacons painted *black* at the top and *white* below. The southern bank should then be followed to Bayonne.

The anchorages are:

Anchorage.

1. Between the Casquets and the up-stream end of the mole of Blanc-Pignon. About 100 yards from the mole is a depth of $2\frac{3}{4}$ fathoms.

2. Abreast of Boucaut, 100 yards east of the easternmost beacon on the Casquets, in 2 fathoms water, mud bottom.

3. 200 yards SE. of the Casquets, in 4 fathoms water.

4. All along the promenade of Bayonne, in 3 to 5 fathoms water.

Bayonne is a flourishing town of some 26,000 inhabitants, in the department of the Basses Pyrénées. It stands on the left bank of the Adour, which is here about 250 yards wide, $3\frac{1}{2}$ miles from its mouth, at the confluence of that river with the Nive. The latter divides the town into two nearly equal parts. That to the eastward is called Great Bayonne, or simply Bayonne, and the other, Little Bayonne, the two being connected by iron and stone bridges. The suburb of Saint-Esprit, on the opposite side of the Adour, and inhabited mainly by Jews, the descendants of fugitives from Spain, does not belong to the commune, but forms a separate commune in the department of Landes.

Town of Bayonne.

Bayonne is strongly fortified, and has handsome quays and promenades, a cathedral of the twelfth century, a mint, a theatre, a seminary, schools of commerce, chamber and tribunal of commerce, distilleries, sugar-refineries, and glass-works. In Saint-Esprit are the arsenal, one of the finest in France; the citadel, built by Vauban in the seventeenth century, whose batteries command both towns, the river, and the plain; and the military hospital, in which 2,000 invalids may be accommodated.

Bayonne has naval and commercial docks, one of which is 213 feet long, and 32 feet broad at the entrance, with 1 foot of water on the sill at low-water springs. It will take the largest vessel that can enter the river.

Docks.

Trade. In 1870 about 430 vessels sailed from this port. Since that time, however, the trade has been increasing, notwithstanding the blow given to the coasting trade by the opening of railways. A line of French steamers, of 500 and 600 tons burden, run regularly to Antwerp, carrying large quantities of resin and turpentine, which, with wood and cast-iron, are the principal exports. The latter article has only been a staple recently, a company having been formed to work an ore mine of very valuable quality near Saint-Jean Pied de Port. When the harvest is good there is also a brisk exportation of grain. The principal import is coal, 30,000 tons being shipped here annually from England alone.

Ship-building is carried on.

Supplies. Coal, water, and provisions are plentiful.

Port charges. Port charges, on a vessel of 95 tons, loaded in and out, as given by M. Duverdier, ship-broker, Bayonne, in 1872 :

	Fr. Centimes.	
To the board of health and quarantine expenses, 10 centimes per register ton	9	50
To the pilotage from sea, (as per agreement made by the master)	0	0
To the pilotage over the bar and up to Bayonne	32	50
To the steamboat's expenses for bringing the vessel in, 5 per cent. for towing, and 50 centimes per ton	45	70
To the clearance inward, at the rate of 50 centimes per registered ton	47	50
To the report at the customs office, (when loaded)	10	00
To the steamboat's fixed dues* as per bids, 30 centimes inward and 30 centimes outward	57	00
To the signal dues <i>in</i> and <i>out</i> to the head pilot of the bar.	12	00
To the brokerage for reporting vessel out and attending to ship's business	47	50
To the pilotage down to Boucaut	8	00
To the stamps and small expenses	5	00
To the chartering commission on the outward cargo from Bayonne, 5 per cent.	0	00

Shipmasters and owners generally insert the following clause in their charters: "The two-thirds of the steamboat's fixed dues and towage are to be re-imbursed by the cargo."

* If coming in or going out in ballast, the rate is to be less for the fixed dues; say, 5 centimes if coming in in ballast, and 30 centimes with cargo.

The coast from the mouth of the Adour runs N. by E. Coast.
62 miles to point Arcachon. It is straight, sandy, low, and flat with exception of a few sand-hills covered with pines. These sand-hills, for a distance of 20 miles northward from Bayonne, are from 120 to 170 feet in height, and extend about half a mile inland. Their form is continually changing, as is also that of the shore to a certain extent. The latter recedes about 3 feet annually.

The land and sea breezes blow in a direction nearly normal to the coast. In winter, with the thermometer at the freezing point, the former come from SE., south of Arcachon, and, north of that, from ENE. Land and sea breezes.

It is between Contis light and Arcachon that vessels bound to the southward first begin to feel the influence of the Pyrenees. Leaving the Gironde with clear weather, and a light northerly or northwesterly breeze, on approaching the coast of Spain calms will be found or light airs from the southward. In winter, unless the barometer be very high, these southerly airs will be met as far north as the Bassin d'Arcachon.

The soundings between Bayonne and Arcachon are very regular for some distance to seaward, the bottom being sand, gravel, and shells. At $5\frac{1}{2}$ miles from shore is a depth of 30 fathoms; at 1 mile, 10 fathoms; at one-half mile, 5 fathoms, within which line are occasional patches of 3 to 6 feet at low water. Soundings.

But 8 miles north of the entrance to the Adour, abreast of Cap Breton, there is a singular break in the soundings, called the Fosse de Cap Breton, with deep water over mud bottom, from seaward almost up to the beach. Its general direction is about W. by N., and E. by S., being indicated by a semaphore and a beacon on the sand-hills, bearing, when in line, S. $79^{\circ} 45'$ E. At 6 miles from shore it is about $1\frac{3}{4}$ miles wide, and 174 fathoms deep; at $2\frac{3}{4}$ miles, it is three-fourths mile wide and 205 fathoms deep; at one-quarter mile, one-half mile wide, and 17 fathoms deep; and is 8 fathoms deep at less than 2 cables from the beach. Fosse de Cap Breton.

Over this submarine valley, when the sea is heavy and coming from the westward, the waves are like those of mid-ocean, long with moderate height, while on the borders their transformation is perfect to a short, chopping sea that

has proved fatal to many a good ship. With the sea from the northwestward, it is the southern edge of the gulf that breaks the worst; with a westerly swell, and wind from SW., it is the northern edge that is the more dangerous. Of course, notwithstanding the comparative smoothness of the water there is no anchorage save close inshore, for the very reason of the great depth that causes that smoothness. However, ships and even coasters have been known to ride out heavy gales of wind at single anchor, about three-fourths mile from shore, when the sea everywhere else was tremendous.

Anchorage.

Although the improvements at the mouth of the bay of Saint-Jean de Luz have given mariners another shelter during bad weather, it may often happen that a vessel caught to the northward of the Adour may only have the alternative of putting to sea or finding an anchorage.* If the latter be preferred, make as much of an offing as possible, (less than 5 miles would be dangerous,) and bring the semaphore and large beacon N. of Cap Breton in one, and steer for them S. 79° E. If thickness of weather should hide these landmarks, the only course left will be to come in parallel to the breakers on the edge of the *fosse*, N. or S. of them, according to the direction of wind and sea as described above. A cast of the lead, if practicable, would show if a vessel were on the approximate bearing, the change in depth being very abrupt. When the beacon S. of the entrance is still moderately open to the northeastward of the clock-tower of Cap Breton, bearing S. 43° E., the depth being 43 fathoms, the ship may then anchor, and will be some distance from the breakers, even after paying out all the cable on board. The holding-ground being excellent, it might be deemed advisable to put two cables on one an-

* M. Beauteemps Beaupré said: "We think that in bad weather there would be less danger, as a rule, in remaining at anchor on the mud and sand bank off the mouth of the Adour than in skirting the coast to reach the deeps of Cap Breton, or trying to make an offing against a head wind." Although this eminent surveyor was called the father of hydrography by the English, it must be borne in mind that his remarks were made early in the century, since which time changes in naval architecture have caused many changes in ideas concerning safety of ships. Moreover, the peculiar qualities of different ships may have great weight in deciding a captain as to what course to pursue.

chor, so as to benefit by the well-known advantages of a long scope. In the event of the cable parting there would be time to make some sail forward and get before the sea before being caught in the rollers. The best place to go ashore would be about half a mile S. of the light.

The anchor may possibly drag for some moments before holding. This usually happens here after a squall, and is explained by the fact that from the beach quantities of sand are sent down into this valley by the action of the waves, sometimes covering the mud bottom to a depth of 3 feet, and that in the calmness of the depth below a light coating of soft mud will fall on this temporary bottom. This is demonstrated in the cup of the deep-sea lead.

It often happens, especially in the autumn, that the land-marks are hidden by mists rising from the pond of Ossegore. These mists are generally dissipated by the middle of the day, and always disappear when the wind hauls to the westward.

The channel of Cap Breton is the outlet of the streams of Boudigau and Bouret; its direction is preserved by a timber jetty at its mouth on the S. side. Work has been commenced cutting a communication between the pond of Ossegore and the sea. This, by augmenting the tidal surface, will both widen and deepen the channel. As at the mouth of the Adour, the current, running out against wind and sea, makes an outer shifting bar. To mitigate this evil it has been proposed to build a jetty on the N. side also.

The depth of the channel is such that a ship in the offing can send her boats in two hours before almost every high water, and at springs coasters drawing 9 feet can enter. It is fair to presume that the completion of the work begun will make the channel navigable for larger craft.

Having the increased importance of Cap Breton *in prospect*, a *fixed red* light has been established, 95 yards from the extremity of the jetty. It is exhibited from a white scaffolding, 20 feet high, and is 26 feet above sea-level, visible 5 miles. The anchorage bears N. 64° W. from it.

Cap Breton maintains a life-boat.

There is a semaphore on the Vigies downs. The building is white, mast black, arms white.

Channel of Cap Breton.

Depth.

Light: Lat. 43° 39' 19" N.; long. 1° 26' 55" W.

Life-boat.

Signal-station.

Streams.

There are several small streams emptying into the sea between Cap Breton and Arcachon point. They are of no importance now, being simply the outlets of ponds in the interior, but jetties have been built to keep each channel in one permanent direction, and it is hoped that some day they will serve as ports of refuge for coasters. The principal ones are those of Vieux Boucaut, Huchette, Contis, and Mimisan.

Beacon of Huchette: Lat. $43^{\circ} 54' N.$

At a distance of $14\frac{3}{4}$ miles from the light of Cap Breton, to the northward, is the beacon of Huchette, just north of the entrance to the stream of that name. On the face of this beacon are two triangles, the one at the top painted *black* and the lower one *white*. The entire height above the sea is $75\frac{1}{2}$ feet.

Contis light: Lat. $44^{\circ} 5' 45'' N.$; long. $1^{\circ} 19' 15'' W.$

On the downs, at Contis, about midway between Cap Breton and the Bassin d'Arcachon, is a round *white* tower, 125 feet high, which exhibits, at 164 feet above high water, a *revolving white* light, attaining its greatest brilliancy every *half minute*, and visible 24 miles. The eclipses are not total within a radius of 10 miles. It is a first-order dioptric light.

Beacon of Biscarosse: Lat. $44^{\circ} 20' N.$

To the northward, $15\frac{1}{2}$ miles from Contis light, is the beacon of Biscarosse, 62 feet high, with a circle, painted *black*, at the top, on a sand-down about 30 feet high.

Bassin d'Arcachon.

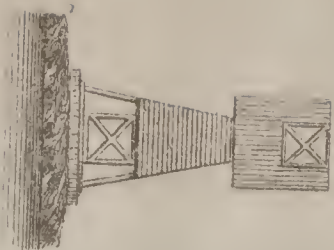
The Bassin d'Arcachon is very extensive, bordered by beautiful smooth sands, and encircled and sheltered by sand-downs covered with fir-trees. There are several spots where a ship can conveniently be hove down. The river Leyre falls into the SE. angle. The fishing is good outside, and furnishes employment to the greater part of the inhabitants of the many little settlements on the shore. Small craft ply their trade on and near the bar, while steamers drag the seine outside. The largest village, Teste de Buch, is on the southern shore, and has a population of more than 5,000. It increases yearly in importance, being admirably adapted for sea-bathing, and connected by railway with Bordeaux. Many foreigners go there to pass the winter.

Commerce.

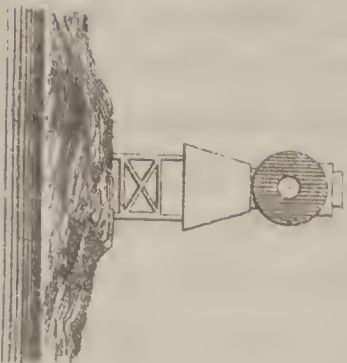
The maritime development has not kept pace with the increase of commerce. A few schooners and other small craft go there for resin and pitch, which the neighboring



Entrance to the bassin d' Arreathon.



Ventays beacon



Biscarosse beacon



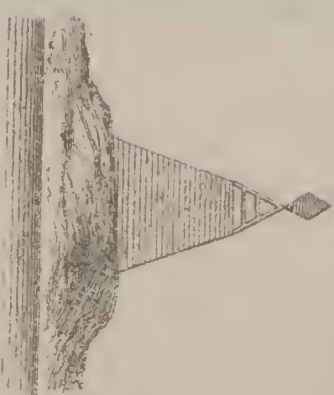
Hourtine Lights



Contis Light



La Huchette beacon



La Grigne beacon

districts furnish in abundance, but the greater part of the products go to Bordeaux by rail.

The navigation of the entrance to this basin is difficult, it running through flats of sand so fine that the action of the wind alone is sufficient to change it. The same phenomenon is observable here as at the mouths of all streams on the coast of the department of Landes, viz, a change in the direction of the channel, brought about by the action of waves striking the coast obliquely. Under that influence the entrance is moved gradually to the southward, until the current loses somewhat of its strength. A gale will then bank up the sand and close it, and the stream will open a way for itself to the northward again, in the prolongation of its inner course. The shifting then recommences, slow and gradual to the southward, and sudden to the northward, and this will continue until the channel is confined between jetties, as in the Adour.

Entrance.

The least water on the bar at low-water springs is 13 feet, inside which the depth increases materially. The sea often breaks on the bar, rendering crossing occasionally impossible. The fishermen sometimes prefer to keep at sea for days in rough weather, rather than risk crossing, and are frequently obliged to run for the Gironde.

Bar.

In the basin at Arcachon it is high water, full and change, at 4^h 37^m. Springs rise 11 $\frac{3}{4}$, neaps 9 $\frac{1}{4}$ feet. The tide is three-fourths of an hour earlier on the bar, and one-fourth of an hour later at Arés and Teste.

Tides.

The slack-water flood lasts about an hour, and slack-water ebb about half an hour.

The tidal current, of both flood and ebb, off the bend of Moullo, is stronger than at the bar, and runs sometimes 4 $\frac{1}{2}$ miles an hour. The flood sets by Moullo, and the ebb by cape Ferret, and there is consequently at Arcachon a network of currents, the origin and cause of the banks and shoals found there.

Currents.

On cape Ferret, the northern shore of the entrance to the basin, is a *fixed white* light, exhibited 167 feet above sea-level, from the top of a circular white tower 156 feet high. It is a dioptric light of the first order, visible 18 miles. The tower has an enlarged base.

Light: Lat. 44° 38' 43" N.; long 1° 15' 06" W.

- Approaching from seaward. When approaching from seaward, the position of the basin will be recognized by the light-tower on the north side of the entrance, where the land is low and destitute of trees; while on Arcachon point, the southern side, the sand-downs are higher and covered with trees. On the latter is a semaphore, the building being painted yellow. The steeple of Notre Dame d'Arcachon is also visible beyond the light-tower on cape Ferret.
- Signal-station.
- Caution. It is impossible to enter at night, save by steamers in the very smoothest and clearest of weather. Sailing-vessels should never attempt it, even in day-time, during the ebb-tide, especially if there be any sea on; because in one place the channel breaks clear across during that tide, and also because of the strength of the current, which, in case of the wind failing, might give the vessel a sheer and bring her broadside on to the sea.
- The end of the flood would be the best time to enter, were the passage of the bar the only point to be considered; but as the anchorage off Arcachon is 9 miles beyond, it is best to cross at half-flood, (unless the vessel's draught be too great,) so as to have the current favorable.
- Directions. The only entrance in 1872 was the pass of Flamberge. To find that, steer east for the Truque de Pelouse, (a wooded and somewhat precipitous eminence to the southward of Arcachon,) until cape Ferret light is open 1 point to the westward of the church of Notre Dame d'Arcachon, or of point Bernet; on this bearing is the fairway buoy, red and black, sphero-conical in shape, with a ball at top. This buoy may be passed either to starboard or port. East from it is the bar buoy, red, with a conical cap at top. Pass this to starboard and steer N. 72° E. for a third conical buoy indicating a change of direction. Pass this to port, pretty close. The channel then runs to the southward and eastward, and is marked by a series of black buoys on the edges of Toulguet and Arguin banks, numbered 1, 3, 5, 7, 9. Pass them all to port while rounding the banks. When abreast of the northeastern buoy on the bank of Arguin (black buoy No. 9) steer N. 22° W. for the fishermen's huts on cape Ferret, leaving red buoy No. 2, of Bernet, to starboard; there is anchorage two cables outside the islet on which these huts are situated.

There is no difficulty after passing the first turning-buoy. The Banc du Sud affords a partial lee, and even if the sea be felt inside, the breakers do not reach the middle of the channel, which is deep.

If there be much sea on, it will be necessary sometimes to conn the ship by the breakers on each side, as the buoys are placed on the bare edge of the banks, and are often hidden in the foam. Caution.

With a SW. wind give the black buoys of Toulinguet a tolerably wide berth, as the surface-current runs to the eastward. Farther up-stream the shore may be approached closer, as it is steep-to; but the depths in that part of the channel are too great and the current too strong to anchor. Near cape Ferret, however, the depths are moderate, and the water smooth, and a vessel would be out of the strength of the flood-tide which sets along the shore of Moullo. Caution.

To keep on up to abreast of Arcachon or to the old wharf of Eyrac, pass the black buoy of Muscla du Sud, and then the red one of Bernet, and anchor 2 cables from the town. If bound still farther up, to the channel of Teichan, bring Ferret light behind Bernet point, to avoid the shoal of Mapouchète, which extends to the southward to within 500 yards of the red buoy of Arcachon. Directions.

In case of being driven on shore, a vessel should avoid if possible the shoals called the Mail du Sud and Mail du Nord. The sea on them is very heavy. The best place would be just south of the semaphore, or else 1 mile to the northward of cape Ferret light. At the latter place all possible aid would be rendered from shore, including that of a life-boat. It would be advisable not to attempt to leave the ship in boats before low water.

The coast from cape Ferret runs about N. $\frac{1}{2}$ E. 52 miles, to Pointe de la Négade, where it trends off to NE. by N., and runs $6\frac{3}{4}$ miles to Pointe de la Grave, the southern point of entrance to the Gironde. It consists throughout of low sand-downs, with occasional clusters of trees. The country for some distance into the interior is of much the same character, sandy and rolling. The undulations on the general surface, originally made by the winds, are parallel to the beach. A short distance inland, and running parallel to the shore, are two lakes or ponds, called the Etang de Coast.

Carcans and the Etang de la Canau. The former, which is the northernmost one, is about midway between cape Ferret and Pointe de la Négade.

River Anchise. Abreast of the Etang de Carcans a small stream, known as the river Anchise, empties into the sea. It is of no importance, the smallest coasters having difficulty in entering. Off the bar in the NW. entrance is a bell-buoy.

Soundings. Off the coast of this department, called the Gironde, the depths are very regular, with sand and occasional mud bottom. With an approximate latitude, a few casts of the lead will fix a vessel's longitude quite closely. If sights be not obtainable, the latitude can only be found by a view of the coast. In the total absence of all natural landmarks to aid the mariner in these circumstances, beacons and light-towers have been erected at nearly equal distances all along the coast.

Beacon of La Grigne: Lat. $44^{\circ} 53' 17''$ N.

On a sand-dune 15 miles to the northward of cape Ferret light is the beacon of La Grigne. It is a *black* pyramid with a lozenge-shaped top.

Hourtin lights: Lat. $45^{\circ} 8' 20''$ N.; long. $1^{\circ} 9' 53''$ W. S. light.

About $15\frac{1}{2}$ miles from La Grigne beacon are two lights, called the Hourtin lights, from the downs on which they are situated. They are both *fixed white*, dioptric lights of the first order, 177 feet above sea level, and visible 20 miles. The brick towers from which they are exhibited are 219 yards apart, bearing from each other N. $6^{\circ} 18'$ E., and S. $6^{\circ} 18'$ W. They are 77 feet in height, situated about 1 mile inland, and form a perfect landmark, there being no other instance on the whole west coast of France of two lights in such close proximity.

The heights of most of the beacons being known, a captain can calculate his distance from shore by their angles of elevation above the horizon, and verify it by sounding. But these two lights of Hourtin simplify matters considerably, as their distance apart is known, and as they can be used by night as well as by day. The table, page 211, gives the distances in miles, corresponding to the angular distances between the two towers on four different bearings. It begins with the angle corresponding to 2 miles, because the towers are over a mile from low-water mark.

Table of distances from Hourtin lights corresponding to their angles of opening.

Angles between towers.											
North tower bearing S. 16° 42' E., or south tower bearing N. 28° 48' E.			North tower bearing S. 38° 42' E., or south tower bearing N. 51° 18' E.			North tower bearing S. 61° 12' E., or south tower bearing N. 73° 48' E.			North tower bearing S. 83° 42' E.		
°	'	"	°	'	"	°	'	"	°	'	"
1	11	00	2	12	46	2	51	21	3	05	26
0	47	21	1	28	30	1	54	17	2	03	42
0	35	31	1	06	24	1	25	44	1	32	48
0	28	25	0	53	06	1	04	35	1	14	15
0	23	41	0	44	15	0	57	10	1	01	52
0	20	18	0	37	56	0	49	00	0	53	02
0	17	46	0	33	11	0	42	52	0	46	25
0	15	47	0	29	30	0	38	06	0	41	15
0	14	13	0	26	33	0	34	18	0	37	07
0	12	55	0	24	08	0	31	11	0	33	45
0	11	50	0	22	08	0	28	35	0	30	56
0	10	56	0	20	25	0	26	23	0	28	33
0	10	09	0	18	56	0	24	30	0	26	31
0	09	29	0	17	42	0	22	52	0	24	45
0	08	53	0	16	36	0	21	26	0	23	12
0	08	21	0	15	37	0	20	13	0	21	50
0	07	53	0	14	45	0	19	06	0	20	37
0	07	29	0	13	59	0	18	03	0	19	33
0	07	06	0	13	16	0	17	09	0	18	34

The beacon of Vendays, about 11½ miles to the northward of Hourtin lights, is *black*, and presents the appearance of a battlement supported on a truncated cone, the top being rectangular, with an opening like an embrasure in the upper part. It is 65½ feet in height from the ground, with a total elevation above the sea of 98½ feet. A vessel 10 miles off shore abreast of this beacon has Cordouan light to the northward, and the Hourtin lights to the southward, in sight at the same time.

Beacon of Vendays: Lat. 45° 20' N.

The beacon of Soulac stands 2½ miles to the north-north-eastward of Pointe de la Négade, and 2¼ miles farther are the beacon and the semaphore of Saint-Nicolas, 2 miles to the southward and westward of Pointe de la Grave.

Beacons of Soulac and St. Nicolas.

CHAPTER VIII.

GIRONDE RIVER TO LES BARGES D'OLONNE.

Variation in 1876.—Cordonan light, $18^{\circ} 35'$ W.; Chassiron light, $18^{\circ} 45'$ W.; Sables d'Olonne, $18^{\circ} 55'$ W.

River Gironde. The Gironde river is formed by the union of the Garonne and Dordogne, and has a length of 39 miles from the confluence of these two streams to point de la Grave, the southern side of entrance. The estuary between the last-named point and La Coubre point is $10\frac{5}{6}$ miles wide, but the width of the mouth of the river proper, *i. e.*, from Grave point to Vallière point, is only $2\frac{2}{3}$ miles, increasing from that to 4 miles near Richard, and decreasing again gradually to the conflux of its component streams.

River Dordogne. The Dordogne is formed by the union of two mountain-streams, the Dor and the Dogne, which rise in Mont d'Or, Puy-de-Dôme, and unite after a short course. It flows westward through the departments of Corrèze, Lot, Dordogne, and Gironde, and, after a course of 250 miles, (for 180 of which it is navigable,) joins the Garonne. Its principal affluents are the Vèsère and the Isle.

River Garonne. The Garonne derives its name from its two head streams, the Gar, which rises in the Spanish valley of Aran, and the Onne, which descends from the glaciers of Aô in the Pyrenees. Flowing NW., it enters France at Pont du Roi, in the department of Haute Garonne. It runs thence NE. to Toulouse, when it flows generally NW. It passes the towns of St. Béal, Montrejeau, St. Martory, Cazères, (where it becomes navigable,) Carbonne, Merret, Toulouse, Verdun, Agen, Marmande, and Bordeaux. Its principal tributaries on the right bank are the Ariège, Tarn, Dropt, and Lot; on the left the Save, Gimoné, Gers, Baise, and Ciron. Its length is about 300 miles, of which 200 are navigable; but including its tributaries, which communicate with 12 departments,

the total river navigation is about 1,000 miles. At Toulouse it is joined by the Canal du Midi, by means of which and by this river the Mediterranean is connected with the bay of Biscay. The basin of the Garonne includes a tract of country about 185 miles in average length and breadth. The upper part of its course lies through narrow defiles, and is much obstructed. From Toulouse it is broad and shallow, and navigation is more or less impeded by the *débris* which it brings down as far as Marmande, 50 miles above Bordeaux. Its banks are fertile and picturesque.

Point la Coubre, the western extremity of the northern shore of the Gironde, is rather low and sandy, but 3 miles in the interior, to the northeastward, are the Grandes Dunes de Brisquette, considerably higher. The point is recognizable by the light-tower, and by the beacon on the shore, a little to the southward. Palmyre light-tower may also be seen over it when approaching from the westward. A little over three-fourths mile to the eastward of the point is the semaphore of Bonne Anse, the dwelling of which is yellow, and the tower white below and black above, toward the sea. La Coubre point.

On La Coubre point, exhibited from a *black* wooden scaffolding 100 feet high, is a *fixed white*, dioptric, third-order light, 121 feet above sea-level, visible 14 miles. Light: Lat. $45^{\circ} 41' 35''$ N.; long. $1^{\circ} 13' 26''$ W.

Pointe de Grave is low and sandy, with higher downs to the southward, and is recognizable by the two square towers and the defenses. About a mile to the southward and westward are a beacon, and the semaphore of Saint-Nicolas; the building of the latter is the higher of the two, painted yellow, and is visible from seaward over the former, which is black. Twice a day the names of vessels entering and leaving are announced at Bordeaux from this semaphore. Vessels should use the International Code of Signals in making their names. The geographical number of the station is B. G. Q. N. Pointe de Grave.

On Grave point, exhibited from a square tower 82 feet high, is a *white* light, *flashing* every 5 seconds. The light is dioptric of the third order, 85 feet above sea-level, visible 14 miles. Signal-station.

On the heights on Pointe de Grave, SW. by W. $\frac{1}{2}$ W. from the latter light, is a square black tower, 28 feet high, with a *fixed green* light, 71 feet above sea-level, visible 7 miles to St. Nicolas light: Lat. $45^{\circ} 33' 47''$ N.; long. $1^{\circ} 05' 07''$ W.

seaward, 12° each side of the line of direction to Grave light.

Grand Banc
light-vessel: Lat.
 $45^{\circ} 39' 52''$ N.;
long. $1^{\circ} 15' 51''$ W.

The Grand Banc light-ship, sometimes called that of La Coubre, is anchored in 8 fathoms water, to the southeastward of La Mauvaise shoal, and $1\frac{3}{4}$ miles to the southward and westward of La Coubre point. The vessel is *red*, and shows two *fixed white* lights, on separate masts, 34 and 23 feet, respectively, above the water-line, both visible 11 miles.

Fog-bell.

In fogs a bell is sounded, in the light-ship; 5 strokes every 30 seconds.

Cordouan light:
Lat. $45^{\circ} 35' 14''$ N.;
long. $1^{\circ} 10' 30''$ W.

Cordouan light-tower is a handsome circular structure, painted white and red, 207 feet from base to vane, built on a rocky shoal, to the southward of the middle of the entrance to the Gironde. From it is exhibited, 197 feet above the sea, a *white revolving* light, with *red* flashes when between the bearings S. and W. $\frac{3}{4}$ S. The interval of revolution is 1 minute. The eclipses are not total within 10 miles. The light is dioptric, of the first order, visible 27 miles. In clear weather the tower is visible 18 miles.

Palmyre light:
Lat. $45^{\circ} 40' 52''$ N.;
long. $1^{\circ} 08' 36''$ W.

Palmyre light is exhibited from an iron tower, 99 feet high, with three pillars, the upper part *black*, and the lower *white*, $4\frac{3}{4}$ miles E. by S. from La Coubre. The light, 157 feet above sea-level, is *red* and *green*, alternating every 20 seconds, visible 14 miles when between the bearings ESE. $\frac{1}{8}$ E. and NE. by E. $\frac{7}{8}$ E. Coming from the westward, this tower and light are visible over La Coubre, clearly defined against the sky.

La Falaise
light: Lat. $45^{\circ} 38' 53''$ N.; long. $1^{\circ} 06' 55''$ W.

La Falaise light, exhibited 46 feet above sea-level, from a circular black and white wooden tower, 26 feet high, is a *fixed red*, catoptric light of the fourth order, visible 10 miles. The tower is on the northern shore of the entrance,

Terre Nègre
light: Lat. $45^{\circ} 38' 49''$ N.; long. $1^{\circ} 06' 29''$ W.

$4\frac{1}{2}$ miles NE. $\frac{3}{4}$ N. from Cordouan. The Terre Nègre tower, circular, *black* and *white*, 76 feet high, 601 yards ESE. $\frac{1}{2}$ E. from the Falaise light-house, exhibits, 121 feet above the sea, a *fixed white* dioptric light of the third order, visible 14 miles. This light is not visible from seaward south of a line drawn from the tower through the NE. buoy of Mont-revel bank.

Chay light: Lat.
 $45^{\circ} 37' 20''$ N.;
long. $1^{\circ} 02' 33''$ W.

The Chay light-tower is 197 yards from the edge of the cliff, square, 62 feet in height, the upper part *black* and the lower *white*. From it is exhibited, 88 feet above the sea, a *fixed red* light, visible 10 miles, through an arc of 24° .

NE. of Chay light is that of Saint-Pierre. This is a *fixed red* light, 177 feet above the sea, visible 12 miles through an arc of 24° , exhibited from a square tower, with *red* and *white* bands, 115 feet high.

One hundred and fifty-two yards from the end of the jetty of Royan, is a *fixed white*, catoptric, fourth-order light, 44 feet above sea-level, visible 10 miles, exhibited from a circular rough stone and mortar tower, 36 feet high.

On Vallière point is Saint-George light, *fixed red*, dioptric, third order, 46 feet above the sea, visible 18 miles through an arc of 15° , exhibited from the top of a house 26 feet high.

On Suzac Hills, 2,734 yards to the southeastward of Saint-George light, at an elevation of 121 feet above sea-level, is a *fixed red*, dioptric, third-order light, visible 18 miles, shown from the top of a house 26 feet high. It illuminates an arc of 15° .

On Tallais bank, in $2\frac{1}{4}$ fathoms water, $4\frac{1}{2}$ miles SE. $\frac{1}{4}$ S. from Pointe de Grave, is anchored a light-ship, painted *red*, showing in the day a red ball, and at night a *fixed white*, catoptric, third-order light, 35 feet from water-line, visible 10 miles. During foggy weather a bell is sounded; 5 strokes every half *minute*.

On the western bank of the river, $9\frac{1}{2}$ miles from Grave point, is Richard light, *fixed red*, dioptric, of the third order, 105 feet above sea-level, visible 16 miles, exhibited from a round tower, 53 feet high, with three pillars.

Off Tour de By, on a $2\frac{1}{4}$ -fathom bank, is anchored a light-ship, painted with horizontal *black* and *red* stripes, showing a *fixed white*, catoptric, third-order light, 34 feet from water-line, visible 10 miles. During fogs a bell is sounded; 5 strokes every half *minute*.

Close to the western shore at Mapon, between Maréchale and Mapon shoals, in $3\frac{1}{4}$ fathoms water, is a light-ship, painted *red*, showing a *fixed white*, catoptric, third-order light, 33 feet from water-line, visible 9 miles. There are 5 strokes of the fog-bell given every half *minute*.

On the western side of the river, half-mile from the shore, Mousset light, exhibited 67 feet above sea-level, from a *black* wooden scaffolding, 46 feet high, is *fixed white*, with

St. Pierre light :
Lat. $45^{\circ} 38' 05''$
N.; long. $1^{\circ} 01' 38''$ W.

Royan light :
Lat. $45^{\circ} 37' 08''$
N.; long. $1^{\circ} 01' 51''$ W.

St. George light :
Lat. $45^{\circ} 35' 57''$ N.; long. $1^{\circ} 00' 38''$ W.

Suzac light :
Lat. $45^{\circ} 35' 22''$
N.; long. $0^{\circ} 58' 53''$ W.

Tallais Bank light vessel :
Lat. $45^{\circ} 30' 42''$ N.;
long. $0^{\circ} 59' 15''$ W.

Richard light :
Lat. $45^{\circ} 26' 24''$
N.; long. $0^{\circ} 56' 01''$ W.

Tour de By light vessel :
Lat. $45^{\circ} 23' 40''$ N.;
long. $0^{\circ} 49' 21''$ W.

Mapon light-vessel :
Lat. $45^{\circ} 17' 37''$ N.; long.
 $0^{\circ} 45' 46''$ W.

Mousset light :
Lat. $45^{\circ} 13' 26''$
N.; long. $0^{\circ} 45' 27''$ W.

red sector in the direction of Gaet. It is a dioptric light of the fourth order, visible 6 miles.

Gaet light: Lat. $45^{\circ} 12' 23''$ N.;
long. $0^{\circ} 44' 55''$ W. At the entrance to the channel of Gaet is a *white* iron beacon, 20 feet high, from which is exhibited, 20 feet above sea-level, a dioptric, fourth-order, *fixed white* light, with *red* sector to the south-southeastward, visible 6 miles.

Patiras light: On the north point of Patiras island, exhibited 43 feet above the sea-level, from a black wooden scaffolding 43 feet high, is a catoptric, fourth-order, *white flash* light, visible 13 miles. Interval of flash 4 *seconds*.

Pauillac lights: On the west side of the river, on the landing-place at Pauillac, is a *fixed green* light, catoptric, of the fourth order, 20 feet above sea-level, visible 7 miles, exhibited from an iron post 18 feet high;

Lat. $45^{\circ} 12' 01''$ N.; long. $0^{\circ} 44' 43''$ W. And on the end of the pier, 23 feet above sea-level, is a *fixed white* light, with *red* sector toward the north, visible 6 miles. This is a catoptric light of the fourth order, exhibited from a *white* iron post 19 feet high.

Blaye lights. At the extremity of discharging-place, at Blaye, is a *fixed yellow* light. At landing-place, in latitude $45^{\circ} 07' 27''$ N., longitude $0^{\circ} 40' 06''$ W., is a *fixed white* catoptric, fourth-order light, 16 feet above sea-level, visible 4 miles, exhibited from a wooden scaffolding. At the entrance to the port of Blaye is a *fixed red* light.

Tides. It is high water, full and change, at Cordouan, at $3^h 37^m$; mean spring rise, $13\frac{3}{4}$ feet; neap, $10\frac{1}{2}$ feet. Equinoctial tides rise 17 and 18 feet. In general, with a strong wind blowing up the river, a favorable tide may be depended upon, and a low one with the wind blowing to seaward.

At Bordeaux the highest tides rise $21\frac{1}{6}$ feet at springs; the smallest neap rise is $10\frac{1}{2}$. Mean spring rise $16\frac{3}{4}$ feet; mean neap rise $12\frac{3}{4}$ feet.

Bore. At high springs the river is liable to a *bore*, which, moving along with impetuous velocity, the crest 13 to 16 feet above the surface of the current, often causes serious damage to vessels. It ascends the Dordogne about 20 miles.

The *Annuaire des Marées* gives for every day the hour and height of high water at Cordouan. There is a retardation of the tide as the river is ascended. The following table gives the number of minutes to be added to the time

of high water at Cordonan, to find the same at different places along the banks :

Month.	Royan.		Richard.	La Maréchale	Pauillac.	Blaye.	Bec d'Ambés.	Lormont.	Bordeaux.
	m.	m.	m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
December, June	23	23	43	1 00	1 12	1 25	1 50	2 44	2 49
January, May, July, November	23	23	44	1 03	1 16	1 29	1 54	2 48	2 53
February, April, August, October	23	23	46	1 06	1 22	1 35	2 00	2 54	2 59
March, September.....	23	23	48	1 10	1 30	1 43	2 08	3 03	3 08

Under some circumstances the preceding will not prove correct. 1. With a SW. wind the tide is propagated more rapidly, making a difference of 10 minutes, sometimes, at Bordeaux. 2. When the river is swollen the tide may reach its height 15 minutes earlier at Pauillac, and 30 minutes earlier at Bordeaux. Below Pauillac there is no appreciable change from the latter cause. Between Cordonan and Pauillac the flood-tide is propagated at the rate of about 18 miles an hour, and between Pauillac and Bordeaux about 14 miles an hour.

At the mouth of the Gironde the tidal currents are subject to considerable variations in duration and strength. Owing to the influence of the current of the river, and the general northerly current along the coast, the flood-tide is felt less in the Northern Pass than in the Southern. In some neaps, with the wind steadily from the southward, the flood may not run at all during the entire day near Coubre point, while near Le Chevrier bank there would be 4 hours of flood and 8 hours of ebb tide. In the Charentais Pass ne ther extreme would be experienced. In the channel of Verdon, inside Grave point, the tidal currents attain a speed of $3\frac{1}{2}$ knots, while farther up, in the Garonne, they do not exceed 3 for the ebb and $2\frac{1}{2}$ for the flood.

During the flood-tide there is a slight transverse current in the lower part of the Gironde, setting toward the eastern shore, caused by the left bank being shoaler than the right. During the ebb the opposite effect is produced, but it is less marked.

At springs it is slack-water flood for 35 minutes at Pauil-

Tidal currents.

lac, and 20 minutes at Bordeaux, and slack-water ebb for 30 minutes at Pauillac, and 20 at Bordeaux. In the freshets these figures are much modified. At Pauillac the ebb may then frequently run all day; farther down stream the ebb would run at the surface, while an under-current of salt water would be ascending the stream.

Pilots.

No large ship should attempt to enter the Gironde without a pilot, because of the shifting of the banks and the uncertainty of finding the buoys in proper position. The pilots are, in general, excellent seamen, and worthy of confidence, and will be met 25 and 30 miles from land.

Tugs.

Steam-tugs are always ready, but it is not obligatory to employ them. The expense can be, and is frequently, avoided without loss of time, especially with spring-tides.

Approaching
the coast.

Soundings.

The depth of water and nature of the bottom are valuable guides to a captain approaching the coast. Coming from the westward on the parallel of Cordouan, 82 fathoms will be found 90 miles off, with fine gray sand and broken shell bottom. Just outside this, the depth increases 160 fathoms in the space of 1 mile. Keeping on to the eastward, at 78 miles from Cordouan are 71 fathoms; at 62 miles, 65 fathoms; at 53 miles, 60 fathoms; and at 45 miles, 55 fathoms. As the soundings decrease, the broken shells become more and more rare in the bottom.

Rule for ascer-
taining distance
from shore.

With depths of 55 to 27 fathoms, the distance in miles from Cordouan may be calculated by subtracting 5 from one-half the depth in *metres*, reduced to low water. This may be relied on as being correct to within 1 mile.

The muddy waters of the Gironde do not branch out equally to the northward and southward of the mouth. Their general direction at first is about WNW., and afterward, influenced by the general northerly current, they flow about NW. In this track the bottom is soft mud to 35 fathoms depth. To the southward this soft mud is not found; even when the muddy stream is driven to the southward by a wind from the northward and westward, there are no traces of it on the sand in less than 40 fathoms.

Coming in on the parallel of $45^{\circ} 15'$, the sudden change of depth spoken of above will be found 80 miles from the coast, and, at 77 miles, 82 fathoms; at 39 miles, 55 fathoms;

at 24 miles, 41 fathoms; and at 2 miles from the beach, 11 fathoms.

To find the distance in miles from the shore, between depths of 55 and 22 fathoms on this parallel, deduct eleven from one-half the depth in *metres*. Rule for ascertaining distance from shore.

Coming from the southward, it must be borne in mind that a vessel will overrun her reckoning, particularly with a southerly wind, owing to Rennell's current. Caution.

Coming from the northward, the lights of Rochebonne or Ile d'Yeu will probably have been sighted. At all events, bottom of red sand speckled with black should be left to port, and the muddy stream followed to the mouth of the river.

It is scarcely possible to be in doubt about Cordouan light, there being only two other revolving lights in the vicinity, that of Contis, 80 miles to the southward, and the Baleines, 40 miles to the northward, both of which have an interval of revolution of half a *minute*. So a captain would rarely be reduced to the necessity of timing the interval of revolution to verify his position. Approaching at night.

With a little fog and peculiar atmospheric conditions, when not far from La Coubre light, and a little to the northward, it may be possible not to see Cordouan at the same time, in which case the former light might be confounded with Chassiron. This confusion may be obviated, and all doubts removed, by sounding. In 16 to 27 fathoms, coarse red sand will be found off Chassiron, and soft mud off La Coubre. Caution.

There are three principal entrances to the Gironde river, equally used, notwithstanding the difference of their depths. Entrances to the Gironde.

The Passe du Nord, the direction of which is that of the stream, WNW., is the deepest. It has $5\frac{1}{2}$ fathoms at low water, and is half a mile wide.

The Passe des Charentais leads ENE. and WSW., with a least depth of $3\frac{3}{4}$ fathoms, and a width of 1 mile.

The Passe du Sud is the shoalest, ($2\frac{3}{4}$ fathoms,) and has a bend in it. It may be entered steering NE.

Owing to the difference of six points in the directions of the first and the last of these, the direction of the wind may determine the one for a sailing-vessel to use. The tidal currents, described above, also give special qualities to each.

The fog off the entrance is often very thick, and yet not Fog.

higher than 75 or 100 feet; the land and sea are completely hidden, while the tops of light-towers are visible above it. There is also sometimes a dry haze, called by the pilots *La Brume Sèche*, accompanied by a calm and a swell in all the channels. This is rather to be feared, particularly by a sailing-vessel.

Passe du Nord. The Northern pass, or *Passe du Nord*, is to be preferred, under ordinary circumstances, for the steamers of the present large size, being the deepest. There is also room for sailing-vessels to beat in or out. The *Banc du Coubre* must be looked out for, as the currents would be apt to drift a ship on it, particularly with a breeze from seaward.

In heavy weather. In heavy weather this is the only pass that is practicable, and the pilots even hesitate to use it, but often advise captains to run for the *Pertuis*. The class of vessel, as well as the state of the sea, will have a good deal to do in determining a captain whether to try it or not. With the flood-tide a large steamer could enter in almost any weather, the best time being about two hours before high water, even though the sea be still breaking in the channel. A sailing-vessel, on the other hand, under the same circumstances, and with all precautions taken of head sail, &c., might very possibly broach-to, or be brought by the lee.

During the ebb-tide it would be dangerous, even for a large, powerful steamer, to attempt, in bad weather, to pass the high sea that would be raised.

Directions. Having made land, and selected the Northern pass, steer for *La Coubre* point, S. 80° E. *Palmyre* light-tower will be seen over it from a distance of 13 miles in clear weather. Keep on this course, passing about half a mile to the northward of the fairway buoy, which is placed 5 miles from *La Coubre* light, sphero-conical in shape, with a ball and prismatic mirror. The two red buoys, indicating the NW. and NE. extremities of *La Mauvaise* bank, will also be passed well to starboard. When abreast the latter, that is, 2 miles from *La Coubre*, the *Grand Banc* light-ship and *Cordouan* will be in line, S. 39° E. Keep this alignment until near the former, when the light-towers of *La Falaise* and *Terre Nègre* will be in line, bearing S. 80° E. Steer for them, or for the old light-tower of *Pontailiac*, a little open to the southward. Shortly after passing the eastern buoy of the

Barre-à-l'Anglais, (black can-buoy with black ball,) on the port hand, and the middle buoy of Montrevel (red nun-buoy) on the starboard, port the helm gently, and look for the two houses from which are exhibited the lights of Saint-George and Suzac. Bring these in line S. 65° E., and steer for them. The nearer of these small houses being 8 miles off, there might very possibly be some delay in finding them. In that case, a safe time to port the helm would be when between the eastern buoy of Barre-à-l'Anglais and the eastern buoy (red) of Montrevel, one-third way from the former to the latter. Then steer S. 65° E., and the light-houses would soon be made nearly in line.

When abreast the old light-tower of Pontaillac, the Tallais Bank light-ship and Richard light-tower will be in line, bearing S. 30° E. When near the light-ship a vessel can anchor or keep on up the river.

Cordouan light will be the first sighted. When the *fixed* ^{Entering at} light on La Coubre point is made, bring the latter gradually to bear S. 80° E. The *red* and *green* flashes of Palmyre light will be seen over it. As the two lights of Grand Banc light-ship approach Cordouan, port the helm gently, bring them in line, and steer for them. The *red* light of La Falaise will gradually approach the *white* light of Terre Nègre beyond. These being only 600 yards apart, will not be much open at any time, and the alignment of them will be liable to inexactness. A vessel should steer for them S. 80° E., when near the light-ship. There is plenty of water for some distance, even to the southward of the latter. Four and a half miles on this course will bring Saint-George and Suzac lights in line S. 65° E. Keep this alignment until Pointe de Grave light bears S. 10° E., and Tallais bank light-ship is on with the *red* light at Richard.

If the breeze be from the eastward there will not be much danger of being set on La Coubre bank, and, instead of standing so long for the Grand Banc light-ship, a vessel could starboard the helm as soon as Suzac light opens to the southward of Saint George light, steering for them until abreast of Pontaillac. ^{With land-breeze.}

In these different courses the least depth on the outer bar is 6½ fathoms, and in the stretch, after doubling La Mauvaise bank, when a vessel would be in the trough of the sea raised ^{Depths.}

Caution.

by a SW. wind, $5\frac{1}{2}$ fathoms. Nothing less than this will be found before passing Pontailiac. Just before reaching Tallais Bank light ship $3\frac{1}{2}$ fathoms will be found on a sort of bar marked by a black can-buoy. By passing this buoy 3 cables to starboard $4\frac{1}{2}$ fathoms can be kept. To do this at night, when abreast of Grave light, bring Richard light open 5° to the eastward of Tallais light-ship; or the buoy may be passed about the same distance to port. As soon as La Coubre light is hidden by the works on Grave point port the helm and steer S. one-half mile for the anchorage.

Beating in.

It is next to impossible to beat in through the Northern Pass unless the flood-tide be running in. With the moon quartering and the wind from S. or SE., it will run scarcely an hour, which would be but scant time even to reach the anchorage inside the Grand Banc. In this case, therefore, it would be better to enter one of the other passes.

Beating out through the Northern pass is always easy, as the tide runs ebb $7\frac{1}{4}$ hours to $4\frac{1}{2}$ hours flood, even with a NW. wind, and slacks for 1 hour after low water.

Whether beating in or out, the buoys are good guides for when to go in stays.

Beating in at night.

Working in at night, having La Coubre light approximately on the bearing S. 80° E., when the depth is reduced to $6\frac{1}{2}$ fathoms, (at low water,) go about alternately, as Palmyre light opens a little to the northward and a little more to the southward of La Coubre, until the light-ship's two lights and Cordouan come near to each other. After that, working in to the southeastward, the ship should be tacked on the northern side of the channel when Suzac light is still a little open to the southward of Saint-George. The boards to the southward may be made quite long, and when near the meridian of the light-ship, may be extended to 1 mile to the southward of it. After passing to the eastward of its meridian to clear Montrevel bank, the ship must be put about when Terre Nègre has just opened to the southward of Falaise light. When Cordouan shows *red* the stretches to the northward may be lengthened to bring Suzac light open to the northward of Saint-George. The channel then is three-fourths mile wide, the range of the two last-named lights leading through the middle.

The buoys will now be reviewed, and directions given for dispensing with them by means of ranges on shore.

When two miles outside the breakers on La Mauvaise ^{La Mauvaise}
bank, shoal, the church-steeple of Marennes, in the northward and eastward, will be just disappearing behind the downs of Arvert. After passing the fairway buoy, 1 mile outside the bank, in ordinary weather a vessel may tack 200 yards from the red buoys. If these should have disappeared, bring La Coubre light-tower open to the northward of that of Palmyre, and go about, tacking again when Terre Nègre light-tower is in one with the old light-tower of Pontailiac. Pass pretty close to the breakers on the northeastern extremity of the bank, and stand to the southward and eastward as soon as they bear to the westward of south. Once inside, the depths are regular, and long stretches can be made to the southward.

A sandy ledge, called the Demi-Banc, extends 3 miles N W. by W. from La Coubre point, running up from there parallel to the coast. The depths vary from 3 to 5 fathoms. On the southern edge is a spot called the Banc de la Coubre, which dries at low water, just outside of which is a depth of $9\frac{1}{2}$ fathoms. The southern limit of the latter is marked by 2 black buoys.

^{Demi-Banc.}

Vessels coming from the northward, with a good breeze from northeastward, need not bring La Coubre and Palmyre lights in one, but may head in S. 39° E. as soon as Cordouan and the light-ship are in line on that bearing. This should not be done with a light breeze, for fear of being becalmed and obliged to anchor near the reefs.

The Barre-à-l'Anglais bank bars the entrance to Bonne Anse, which can be considered but a moderately good anchorage. It is marked by 2 black can-buoys, one of which is placed in 6 fathoms water in the channel, three-fourths of a mile to the westward of the extremity of the bank, and the other 400 yards to the southward of the steepest part of the southern edge. In the absence of these buoys, the beacon of Pontailiac in line with Terre Nègre light gives the southern limit; during the ebb-tide a vessel should tack before making that alignment, as the current might drift her on it while in stays.

^{Barre-à-l'Anglais.}

Montrevel bank. It has been said above that after passing to the eastward of Grand Banc light-ship, Montrevel bank will shorten the boards to the southward. The northern part of this shoal is marked by 3 red buoys, the inner and outer being nun-buoys, and the middle one a can buoy with a red ball. Between them and the buoys of the Barre-à-l'Anglais, the width is about three-fourths of a mile, but it would not be advisable to make stretches longer than two-thirds of a mile straight across. Should these buoys disappear, go in stays when the wind-mills of Didonne come over the fort of Royan. In bad weather Montrevel bank breaks throughout its entire length.

Terre Nègre bank. There is a depth of 4 fathoms on Terre Nègre bank, and as it never breaks, save in a heavy blow, it is not much to be feared. Its northern edge is very abrupt.

Passe des Charentais. Charentais pass is the route over the middle of the Grand Banc, and, with much of a sea from SW., is impracticable from the breakers throughout its length. But in good weather it possesses several great advantages. The least depth is $3\frac{1}{4}$ fathoms at low water, and in the case of sailing-vessels, with a southerly wind, they could reach Royan in one tide, while it would take them two coming in through the northern pass.

Directions. Bring Palmyre light one-half point to the southward of the light-ship, N. 75° E. Steer this course beyond the latter, which will have been passed one-half mile to port, until Falaise and Terre Nègre lights come in line, and then follow the directions given above.

Beating in. Beating in through this pass is easy, as stretches of 3 miles can be made with $3\frac{1}{4}$ fathoms water. At night, as by day, the ranges for tacking are Palmyre light open one-half point to the northward, and 1 point to the southward of the light-ship.

Passe du Sud. The Southern pass, or Passe du Sud, is to be preferred for vessels, entering with a S. or SW. wind, and going out with a northerly wind. There is less water in it than in the Charentais pass, but the shoal spots are inside of Cordouan, and not exposed to much swell. It is possible, with good, careful pilotage, to have never less than $3\frac{1}{2}$ fathoms.

As soon as Cordouan is sighted, shape a course to pass $4\frac{1}{2}$ miles to the southward of it, (being careful, if at any distance from land, to make allowance for the northerly current,) and the fairway-buoy, black and red, will be met $5\frac{1}{2}$ miles SW. $\frac{1}{2}$ S. from the light. Pass to the southward of this, and the semaphore of Saint-Nicolas will soon be seen over a *black* beacon, bearing N. 71° E., which alignment leads up the outer channel; or the alignment of Grave and Saint-Nicolas lights may be made in the offing and kept. When north of the outer buoy, (red,) off the Banc des Olives, four buildings will be made to the westward of the town of Royan, which, taken two and two, give nearly parallel alignments.

Directions.

During the day, either the latter alignment or Chay light on with Saint-Pierre light may be taken, but only for 2 miles, until approaching a black can-buoy; then port the helm a little to bring the Saint-Pierre light-tower between the tower and light-tower of Chay, on which range $3\frac{1}{2}$ fathoms will be kept.

Continuing on this course, gradually bringing the lights in one again, as the red nun-buoy off the Platin de Grave is approached, give it a good berth, leaving it to starboard as the flood sets on to that bank.

Caution.

After passing the buoy off the Platin de Grave, steer east to bring Tallais light-ship and Richard light-tower in one.

It would be delicate work at night to keep in $3\frac{1}{2}$ fathoms, in the southern pass, but by keeping Saint-Pierre and Chay lights moderately open, the latter to the westward, $2\frac{1}{2}$ fathoms can be kept.

At night.

To find the channel, steer N. 63° E. for Grave light, and Saint-Nicolas light will be made under it. When Cordouan bears about N. $\frac{1}{2}$ E., Chay and Saint-Pierre lights will be made, the one over the other in line N. 47° E. Steer for them for about 2 miles, then port the helm gently, and for a few cables' lengths keep the lower one (Chay) a little open to the westward of the upper, (Saint-Pierre.) Bringing them again in line vertically, keep on that course until Cordouan shows *red*; the ship's head may then be laid east for the alignment of Tallais and Richard lights.

The course may be changed to the eastward off the Platin

15 N C

de Grave, when Tallais light-ship shows clear of the end of the jetty of Grave.

Caution.

If the night be dark, and the vessel high out of water, care must be taken not to mistake the moment of its emerging from behind the downs of Grave, for that of its clearing the end of the jetty. This mistake might put a vessel on a shoal spot on the Platin de Grave, with only 3 feet of water on it. It is best to enter the *red* sector of Cordouan.

Beating in.

With northerly winds and flood-tide, vessels coming from the southward have an advantage in beating up the southern pass, instead of working up outside to one of the outer entrances. While first approaching the entrance to the channel, the limit of the stretches to the northward is with the northern buoy of the Banc des Olives on with the beacon of Vieux Soulac, or the black can-buoy of Le Chevrier on the same range. Le Chevrier is avoided by having Saint-Pierre church steeple barely open to the westward of Chay tower.

Rouffiat bank.

The alignment of the light-towers of Chay and Saint-Pierre leads over the bank of Rouffiat. A large vessel should tack to the eastward of this range, on approaching the black can-buoy of Rouffiat, making another stretch to the northward and westward when one half mile north of the buoy, or when Suzac point appears from behind the defenses of Grave. After that boards may be made to about three-fourths of a mile of Cordouan, when the steeple of Vaux will be a little to the eastward of the gully between Saint-Palais and Pontailiac.

La Négade point.

Working up from the southward, even with a smooth sea, a vessel off La Négade point should not go inshore of Cordouan on with Palmyre light.

Banc des Olives.

When abreast the red buoy off the west end of the Olives bank, a vessel may run farther to the eastward, but not farther than the line between the two buoys of that bank. Farther up, go about when Saint-Pierre light is hidden behind the tower of Chay; that will lead clear of all dangers, including Saint-Nicolas bank and the Plateau de Grave.

Saint - Nicolas bank.

Saint-Nicolas bank is rocky, and is indicated by a red buoy in $2\frac{3}{4}$ fathoms water. To steer clear of it, the pilots use the range of Saint Pierre steeple over the western para-

pet of the fort of Royan. But this is only good for this bank, as it leads in too close to the Plateau de Grave.

Coasters with a northwesterly breeze frequently go inside the Platin de Grave. The channel is quite broad, with 3 fathoms water. To keep the middle of it, as soon as Suzac point opens from the jetty on Grave point, steer so as to pass about 200 yards from the end of that jetty. That course, N. 80° E., will leave the southern buoy of the *platin* 600 yards to the northward.

When working in at night, go about alternately as Saint-Nicolas light (sometimes called La Claire) opens moderately to the southeastward and northwestward of Grave light, and afterward, as Chay light opens, not quite so much, to the left and right of that of Saint-Pierre.

Vessels are frequently obliged to anchor while working in the different passes of the Gironde.

The first temporary anchorage is about 2 miles southwest from La Coubre point, in 7 fathoms, sandy bottom, the ranges being: light-ship in line with Grave light, and La Coubre light on with the southeasternmost of the downs of La Brisquette. This anchorage is out of the question in rough weather, as during the ebb-tide a vessel would lie wallowing in the trough of the sea. Nearer to La Coubre point the currents are too strong.

Farther up-stream, good anchorage will be found off Montrevel bank, bringing Suzac light-tower a little open to the southward of Saint-George light. The currents are not strong there.

Vessels sometimes anchor off Royan. The harbor itself has a depth of only 1½ fathoms, and there is a heavy surf there during a southwesterly gale; but between the town and Saint-George bank, any depth can be found up to 13 fathoms. At 400 yards from the harbor-light, with Vallière and Suzac points in line, is a depth of 3¼ fathoms, mud bottom. To anchor in 5½ fathoms, bring the point on which stands Royan fort in line with Terre Nègre light-tower. The bottom there is gravel.

Saint-George bank breaks when other places of the same depth do not. This is caused by the abrupt change from 12 fathoms to 4½, and finally to 3 fathoms. During a heavy sea the breakers join those of Vallière point, blocking the

eastern channel, in which are 7 fathoms. A black can-buoy marks the NW. extremity. Standing in, north of the bank, for the anchorage, keep Royan light a little to the right of the last houses to the eastward of the town, passing the buoy to starboard. Descending the river, to pass inside the bank, bring Saint-Pierre light-tower over Vallière point, passing about 400 yards from the latter, and then head for the tower of Chay.

Verdon anchorage.

The anchorage of Verdon is very extensive, and much frequented, notwithstanding several drawbacks. Outward-bound vessels often remain there a fortnight, waiting for favorable winds or weather. There is communication with Bordeaux by means of the semaphore of Saint-Nicolas, and agents in the former city can consequently send orders, and tugs can be obtained, either for putting to sea or ascending the river. In winter, particularly, the anchorage is apt to be crowded.

Vessels coming in generally come to below Tallais light-vessel, on or near the line between it and Grave point, in $4\frac{1}{4}$ fathoms, sand and mud. The best bearings are the extremity of the works of Grave on with Palmyre point, or with the light-ships of Tallais and By in line, and the village of Verdon in line with the semaphore of Saint-Nicolas. The pilots have other marks, but the foregoing are ample and easily found.

The principal disadvantage in this anchorage is, that in stormy weather, the swell heaving in round Grave point will sometimes make ships override their anchors while lying to the ebb, and part their cables in surging. Every year there are a number of anchors lost which the pilots have to weigh. To remedy this, it is the intention to plant mooring-buoys here just clear of the track of vessels.

Anchorage of Chambrette.

To the northeastward of the up and down stream range of the anchorage of Verdon, deeper water will be found, but also stronger currents. Abreast of Chambrette, however, near the shore, north of Barbe Grise buoy, in 5 fathoms water, the currents are feeble.

Boats can land at high water on the beach abreast the town, or at half-tide at the pier of Verdon.

Navigation from Verdon to Pauillac.

The breadth of this portion of the river diminishes from 4 to $2\frac{1}{2}$ miles abreast of Pauillac. A range of banks divides

the stream, forming two channels, one along the coast of Médoc and the other along that of Saintonge. The former is used almost exclusively, being deeper and more completely buoyed.

The direct route from Verdon to Pauillac, either by night or by day, is made by ranges of lights, either ashore or afloat. Leaving the anchorage of Verdon, if below the light-ship, as is generally the case, pass it 200 yards to starboard and run 2 miles, keeping it open half a point to the southward of Grave light-tower. Then bring them in line, steering SE. for the light-ship of By, distant 10 miles from that of Tallais.

Midway between these two light-ships, off Richard light, a little outside the line of Tallais and Grave lights, is a sunken wreck. This is marked by a vessel of thirty tons, anchored to the eastward of it, and showing at night from the mast-head a *fixed red* light, which, being visible only 4 miles, cannot cause any confusion in ranges.

Wreck.

The least depth in this stretch of 10 miles is $2\frac{3}{4}$ fathoms at low water near the light-ship of By. The latter may be passed either to starboard or to port, according to the direction of the wind, but not farther off than 200 yards. Then Mapon light-ship and Patiras light should be brought in line, S. 22° E.

In the day-time the former can always be made from abreast of By, but not so the latter, the tower being only 43 feet high. The course in the deepest part of the channel lies parallel to and 600 yards from the river-bank after leaving Castillon, and a red can-buoy is anchored off the rocky ledge jutting out from Loudenne.

Pass Mapon light-vessel to starboard, and bring it back in line astern with that of By, keeping the course S. 22° E. until Saint-Lambert light-tower is in line with the lighthouse on the end of the steamboat pier at Pauillac.

During the flood-tide there is an easterly set here, which must be guarded against, the channel abreast of Padarnac being very narrow.

Caution.

There is anchorage for $1\frac{3}{4}$ miles between Le Lazaret and Pauillac. Ocean steamers come to in the lower part, the depth being $3\frac{2}{3}$ fathoms at low water. Farther up there is less water, and the channel is narrower.

Anchorage.

Quarantine
ground.

Off Le Lazaret is the quarantine ground. Off Pauillac the anchorage is about 300 yards from the quay, with the pier-head light open to the westward of Saint-Lambert light, or Gaet light to the westward of that of Mousset. It is best to come to below the piers, as the river-steamers might foul a vessel above.

No vessel attempts to ascend the Garonne or Dordogne without a pilot. In the former, the general directions at night are to pass all *green* lights to port, and *red* lights to starboard.

Royan.

There are many towns and villages on the banks of the Gironde. Among these Royan is noticeable. It is opposite point de Grave, and derives a certain importance from local commerce and from the number of bathers that come there during the season. As the port is improved, it will probably become the station for tugs.

Pauillac.

The first town, in point of importance, on the river is Pauillac, on the left bank, 27 miles from point de Grave. Vessels of too great draught to reach Bordeaux come here to load and unload, and add largely to the trade of the latter city. Outward-bound vessels provision and water ship here. The trade was first opened in 1869 by an English company, with a monthly steamer to Liverpool. In that year the British-laden tonnage was 21,600. In 1873 the whole tonnage was about 199,400, of which 192,200 was in English bottoms, and the remaining 7,200 principally in Spanish, Dutch, and German steamers.

Blaye.

About 5 miles above Pauillac, on the opposite bank, is the town of Blaye, noted for its fortifications. Its population is about 5,000. Many of the pilots reside there.

Libourne.

The principal town on the Dordogne is Libourne, situated at the confluence of that river and the Isle. It has a population of 14,000. A few vessels come there annually with cargoes of coal from England, and timber from Sweden and Norway. Vessels of 250 tons can be received.

Bordeaux.

The city of Bordeaux is situated on the left bank of the Garonne, 13 miles from the confluence of that river with the Dordogne, and 52 miles from the mouth of the Gironde. It is in the shape of a crescent, and connected with its suburb, Bastide, by a stone bridge 1,590 feet long, with 17 arches, completed in 1821 at a cost of \$1,300,000. In the old part

of the city the streets are narrow and crooked, and the houses poorly built; but in the new part the streets are well laid out and handsome, containing many elegant buildings. Besides the palace or amphitheatre of Galliennus, very few remains of the Roman monuments are to be seen. Those of the Middle Ages have been better preserved; among them are the cathedral of Saint-André, an imposing though irregular edifice, consecrated in 1096, and completed in the fifteenth century; the church of Saint-Michel, built about the twelfth century; the church of Sainte-Croix, built before the middle of the seventh and restored by Charlemagne; the imperial college and other ancient buildings. The modern aspect is admirable. The broad curve of the Garonne is lined with crowded quays, adjacent to which are some of the most commodious warehouses in Europe. Two of the old gates of the city still remain, the Porte du Palais, formerly the entrance to the palace of the Dukes of Aquitaine and the Seneschals of England, and the Porte de l'Hôtel de Ville, which is surmounted by three antique turrets. There are numerous open squares, broad avenues, and fine promenades. The finest of the squares is the Place des Quinconces, which occupies the site of the ancient Château Trompette. The public garden, in the same neighborhood, is elegantly laid out, with conservatories, &c. Among the finest of the modern edifices of the city are the Grand Théâtre, erected in 1780, capable of seating 4,000 persons, and presenting one of the handsomest exteriors in Europe; the Bourse, in which the merchants daily assemble under a glass dome covering an inner court 95 feet long by 65 broad; the Palais de Justice, and the Hôtel de Ville, formerly the palace of the archbishop. There are several fine churches besides the mediæval ones already mentioned; among them Saint-Michel, which has a lofty detached tower and some fine works of art, and Saint-Seurin, remarkable for its finely carved porch and curious bas-reliefs. There are also a gallery of paintings, a museum containing many historical relics, a museum of natural history, and a public library containing 140,000 volumes. The imperial college, academy of arts, sciences, and belles-lettres, and the botanical garden, with courses of study and lectures, are among the

learned institutions; and there are numerous schools and educational associations.

Hospital.

* The civil hospital of Saint-André, one of the finest in the south of France, is situated in a good portion of the city, occupying nearly an entire block. The building has piazzas overlooking a beautiful botanical garden. Running right and left from the central hollow square are ten halls, each capable of accommodating 40 beds, and separated from each other by gardens, permitting free access of pure air to all the wards. Ten medical officers, and as many assistants, have charge of the sick. The poor are admitted gratuitously; others pay from 5 cents to \$1.60 per day, according to their accommodations.

Abreast the city of Bordeaux the river is one-third mile wide, and the currents are very strong, running at times 4 miles an hour, so that a vessel, arriving or departing, has to wait for the tide to serve. Sailing-vessels, as a rule, would find it best to club down, with the flood-tide, to the anchorage, and get under way at the beginning of the ebb, sending lines to neighboring ships to assist in casting.

The harbor-masters generally place ships in three lines along the shore as far as the bridge. The operations of loading and unloading are carried on by means of steam-cranes or by bridges from the vessel to the quay; or lighters may be had.

Wet dock

† The wet dock is 655 yards long by about 130 wide, and has three small basins branching from it. Of the latter, one is 153 yards long and 43 broad, with a minimum depth of $26\frac{1}{4}$ feet of water; the dimensions of the other two are approximately 130 yards by 110 yards, with a least depth of $24\frac{2}{3}$ feet.

The quay surrounding the wet dock is 1,968 yards in length, being 2 feet above the level of the highest waters of the Garonne. Two locks, separated by a pier 11 yards broad, give entrance to the basin; the larger, used principally for the side-wheel steamers, is 166 yards in length

* From report of Surgeon Wm. Bradley, U. S. N., May, 1874.

† The work on the dock is not finished. It is expected that it will be completed in the course of the year 1877.

These details were obtained through the kindness of Mr. Benj. Gerish, jr., U. S. consul at Bordeaux.

between the gates, with a width of 24 yards. The other is 15 yards wide, and is divided by intermediate gates into two parts, 83 and 65 yards long respectively. The floors of both locks are $9\frac{3}{4}$ feet below the level of lowest spring-tides. There will consequently be found at high water an average depth of 23 to 26 feet, increased occasionally to $30\frac{3}{4}$ feet, and sometimes reduced to $20\frac{1}{3}$ feet. The last occurs but rarely, and is never the case for two days in succession.

A graving dock opens obliquely on the left side of the basin, about 220 yards from the inner gate. It is 153 yards in length. Graving dock.

The total area of the establishment is about 128 acres, of which 29 are devoted to the storage of merchandise. Of the latter, 14 acres are reserved by the chamber of commerce for the establishment of store-houses.

* In addition to the above public docks there are several small private dry-docks and one floating-dock. There is also an inclined railway that has taken up a steamer 300 feet long. Private docks.

The city is not distinguished for general manufactures. There are some cotton factories and sugar refineries, and brandy, vinegar, cordage, gloves, and musical instruments are made. Industries.

“There are several machine-shops in Bordeaux, with smitheries and founderies attached, and most of them are conveniently situated on the street fronting, or very near the river. * * * Copper-work of all kinds can be obtained from the same parties that construct the boilers. * * * The mechanics work very slowly, and it is impossible to hurry them. All necessary repairs could be made to machinery. * * * If time were an object it would not be advisable to have extensive repairs made at Bordeaux.” † Machine-shops.

There is but one bank in the city, and that was transformed in 1848 into a branch of the Bank of France.

“The rate of exchange varies, and is on London, at 60 days’ sight, 25 francs to the pound sterling, and on the United States, $5\frac{30}{100}$ francs to the dollar.” ‡ Exchange.

* From the report of Lieut. Com. Chas. W. Tracy, U. S. N., U. S. steamer Alaska, May, 1874.

† Extract from report of Chief Eng. Robert Potts, U. S. N., May, 1874.

‡ Extract from report of Paymaster R. P. Lisle, U. S. N., May, 1874.

Population. The population of Bordeaux in 1872 was 194,241.

Commerce. A favorable climate, fertile soil, industrious and frugal peasantry, and annually increasing channels of transport for goods, are stimulating production and the interchange with foreign markets that this naturally leads to. Accounts show that the trade has increased and is increasing in a far higher ratio at Bordeaux than in any other sea-coast district. Comparing the year 1865, the last before the abolition of the navigation disabilities which took place in 1866, with 1873, the laden tonnage employed in the trade of Bordeaux with all foreign countries increased from 724,900 to 1,239,800, or 71 per cent.

It is a noticeable fact, however, that the total value of declared exports to the United States in the year ending September 30, 1874, suffered a decrease of \$1,058,460, as compared with the preceding year, or 47 per cent.

Exports. The principal exports are wine, brandy, grain, fruit and seeds, resin, turpentine, and pine lumber.

Imports. The principal imports are colonial produce, cotton, dye-stuffs, hides, tobacco, rice, coffee, sugar, cocoa, pepper, &c.

Tug-boat charges 60 to 70 centimes per ton register, from Pauillac to Bordeaux, and *vice versa*.

The cost of placing a ton of merchandise alongside a vessel in the stream is paid by the shipper.

The use of the steam cranes is one franc per ton, of which the vessel pays 20 centimes.

Goods lying under the sheds pay 10 francs per day. Labor, 5 francs per day.

Mooring or buoy dues, 10 centimes per ton per month.

Ballast, 1 to 3 francs per ton, put on board and spread out.

Tonnage dues, 20 centimes per ton register. Quarantine dues, 20 centimes per ton.

Supplies. Water, 3 to 5 francs per tun. Coal, \$6.80 per ton. The keel of coals is reckoned at 256 hectolitres *comblés*.

Port regulations. Here, as in other French ports, every ship-master must report at the captain of the port's office within 24 hours after his arrival, giving his own name, name of his vessel, owner, tonnage, draught, port of departure, and cargo.

Inward expenses of a vessel of 400 tons register, drawing 16 feet with cargo:

From 1st April to 30th September:

	Francs.	Centimes.
From sea to Verdon.....	66	50
From Verdon to Pauillac.....	66	50
From Pauillac to Bordeaux.....	83	12
	<hr/>	<hr/>
	216	12

From 1st October to 31st March:

From sea to Verdon.....	99	75
From Verdon to Pauillac.....	66	50
From Pauillac to Bordeaux.....	83	12
	<hr/>	<hr/>
	249	37

Broker's charges:

Manifest for the custom-house.....	6	00
Declaration.....	4	45
Sea protest.....	13	50
Telegraph of arrival.....	5	50
Entering fees, 50 centimes per ton register.....	200	00
Petty expenses.....	5	00
	<hr/>	<hr/>
	234	45

Outward expenses of same vessel:

Pilotage.....	234	74
Pass.....	8	00
Outward manifest.....	12	00
Advertising.....	60	00
Bill of health.....	10	00
Brokerage on freight procured and expedition, 1 franc per ton of cargo.....	0	00
Charter-party and stamps.....	5	50

Received from M. TH. COLUMBIER, courtier maritime, Bordeaux.

	Per ton register.	
	Francs.	Centimes.
Commission on vessels arriving, laden, or in ballast....	0	50
Commission on vessels leaving in ballast.....	0	50
Commission on vessels loaded per charter-party, or on owners' account.....	1	00
Commission on vessels loaded on freight, (not chartered).....	1	50

The above expenses do not include consular charges, stamps, or surveyor's visit.

From La Coubre point to Arvert point is a 6-mile stretch of low, sandy coast, running N. by E., with numerous sand-downs of small height; on one of the latter, 1 mile south of Arvert point, is a semaphore. Coast of Arvert.

Pertuis de
Maumusson.

Maumusson point, the south end of Oléron island, is $1\frac{1}{4}$ miles to the northward of Arvert point, and between the two is an inlet, called the Pertuis de Maumusson, in which, at low water, is a narrow, winding channel, with 18 to $42\frac{1}{2}$ feet of water. But to enter, it is necessary to pass a bar, which breaks heavily in bad weather, having but $6\frac{1}{2}$ feet on it at low water, between Les Mattes and Gatsau banks. The first of these extends $2\frac{1}{2}$ miles to the westward and northward of point d'Arvert, and the second $1\frac{3}{4}$ miles to the westward of Maumusson point.

Light: Lat., 45°
 $47' 49''$ N.; long.,
 $1^{\circ} 08' 41''$ W.

In the SE. angle of the Pertuis, on the left bank of the mouth of the Seudre, is a *fixed white* light, exhibited, at an elevation of 23 feet above sea-level, from the roof of the keeper's dwelling, which is painted white. In clear weather the light is visible $8\frac{1}{2}$ miles when between the bearings of S. 60° E. and N. 44° W. through SW.; it only serves to assist the interior navigation.

The Pertuis has a bad name, and deservedly, the ocean swell heaving in and striking the channel, the banks and bottom of which are of sand. It is only owing to the great professional skill of the pilots that vessels have ever been able to enter.

In good weather it is a channel of great convenience to vessels leaving the Gironde bound for the Charente. The distance is diminished by one-half—from 32 miles round Chassiron, to 16. Sailing-vessels bound the opposite way can take advantage of the early land-breeze, going out through the Pertuis, and have the sea-breeze to enter the northern pass of the Gironde. Should they have to pass out to the northward of Oléron island, the breeze would frequently fail them when abreast of l'Ile d'Aix, and they would have to anchor not to be drifted on the beach.

Entering.

It is impossible to enter the Pertuis of Maumusson in bad weather, and generally so during the ebb-tide in any weather. The best time to try it is about 1 hour before high water, as the flood-tide setting with the swell, gives a smoother sea. There is sometimes no sea on the bar with a fresh southerly breeze, in which case the vessel should head in immediately, (the height of the tide permitting,) as in a couple of hours afterward it might not be practicable.

The character of the swell should always be considered, a moderately high and very long sea breaking more heavily than a superficial wave of three times the height.

On approaching the entrance a buoy will be made off the bar, which should be passed to leeward. By that time, if not before, two beacons will be made on the southern shore of the channel, the Galon d'Or and the Lézarde, one of which is fixed and the other movable. These in line, lead in. Should they be hidden in a mist, after passing the outer buoy, steer E. by S. for the buoy of Les Mattes, passing it to port, and then ESE. $\frac{1}{4}$ E. for Gatsau buoy. When inside Les Mattes the bar is passed, and the rest is comparatively plain sailing. Directions.

It would hardly be advisable to attempt to enter without sighting the beacons, as the depths on the bar are constantly changing. Caution.

From Arvert point the southern shore of the Pertuis of Maumusson extends 4 miles in a general direction of E. by N., to the mouth of the Seudre river, from which another stretch of 4 miles runs to the NW. by N., then a short 3 miles to the eastward, terminating, after a 7-mile stretch to the north-northeastward, northward, and west-northwestward, in the Pointe de Piedemont, the south side of the mouth of the Charente. Coast of Pertuis of Maumusson.

From this shore a number of sand and mud banks project, which dry at low water, and are only separated from those of the SE. coast of Oléron island by narrow channels which connect the Pertuis of Antioche and Maumusson. Shoals.

The anchorage of Bry has the great advantage of being completely land-locked, with good holding-ground of mud. In the worst weather, even at high water, no sea can get in heavy enough to endanger a vessel. Anchorage of Bry.

To reach it, after passing the black buoy of Gatsau, starboard the helm, being careful not to let the ship drift with the tide to nearer than 200 yards of the red buoy of Galon d'Or, and steer N. 30° E., having the Maison Gouineau of Le Chapus point in line with Menson point. The anchorage is on that range, and the best place to let go is in 2½ to 4½ fathoms, abreast the beacons of Bry. Directions.

The river Seudre, which falls into the Pertuis of Maumusson, has a muddy bed, with not a rock for 7 miles above the Seudre river.

entrance. Emptying into a bay and not being exposed to the action of waves, the soundings decrease regularly from the mouth, and the holding-ground in 3 and 4 fathoms water is so good that vessels never drag. To ascend the river keep in mid-stream.

Inundations. During the winter, at spring-tides, with westerly winds, the banks of the river are frequently overflowed, and the inundated plain presents the appearance of a vast lake. Under these circumstances it is difficult to keep in mid-channel.

Tides. In the Pertuis of Maumusson it is high water, full and change, at 3^h 31^m. Ordinary springs rise 15 feet; neaps, 10 feet.

Currents. At the moment of low water in the Pertuis of Maumusson a very rapid current runs out the western entrance, and at Le Chapus another runs to the northward. But in half an hour the flood-tide enters from the west and flows past Le Chapus into the Pertuis d'Antioche, while the current of the Seudre still runs down. This continues for 1½ hours, when the tide commences to make up the river, and the strength of the current at the entrance to the pertuis is greatly increased. At high water the current flows to the southward past Le Chapus, because at Gatsau bank the tide falls more rapidly than abreast Le Château. In the Seudre river the currents of flood and ebb run, respectively, at the rate of 2½ and 3 miles an hour.

Oléron Island. Oléron island, which is immediately in front of the mouths of the Seudre and Charente rivers, is 16 miles long SE. by S. and NW. by N., with a breadth varying from 2 to 6 miles. It is moderately high and very fertile, with the exception of a few salt-marshes, from which salt is obtained.

Population. The population of the island is about 17,000, divided among several small townships, of which the principal is Saint-Pierre, situated inland. On the eastern shore, 5 miles to the north-northwestward of the mouth of the Seudre, and 6 miles SW. from that of the Charente, is Le Château, with 3,000 inhabitants, where there are ship-yards, rope-walks, and distilleries.

Dangers. In all directions from the shores project reefs and shoals, which latter extend as far as 2 miles from the seaward coast, and the absence of any natural landmark is a noticeable feature.

At a distance of $6\frac{1}{4}$ miles from point Maumusson, on the west coast, is La Perroche, off which extends the plateau of the same name. Coasters sometimes seek refuge there in a cut that extends some little distance to seaward. Two beacons lead in between the submerged reefs.

La Perroche.

At La Cotinière, 2 miles to the northwestward of La Perroche, is a little tidal harbor, where the pilots of the Gironde frequently come for shelter, and which has been greatly improved by a jetty. The greatest depth, 3 feet at low water, is immediately under the lee of this jetty. A buoy has been placed outside for the boats to make fast to while waiting for high water. Bocharodon rock protects this buoy from a S. or SW. sea. A life-boat is stationed here.

La Cotinière.

Life-boat.

A heavy sea is often found on the Plateau de Chassiron, off the northern end of the island, but a worse one still on that of Chardonnière, which extends 5 miles to seaward from a little north of the centre of the island, with depths nowhere exceeding 11 fathoms. A good berth should be given the latter, by bearings of either Chassiron or La Conbre lights.

Plateaux of
Chassiron and
Chardonnière.

There is a saying among the pilots in the vicinity that "Maumusson draws." The meaning of the expression is that the tidal current entering the pertuis of Maumusson is so strong as to affect vessels some distance off, and more than one leaving the Gironde on the ebb-tide, on losing the wind, have noticed this inshore set, which before long would have put them on the banks of Arvert.

Caution.

The northern extremity of the island is called Chassiron point, and is recognizable by the light-tower and a well-marked saddle not far from it.

Chassiron
point.

On Chassiron point is a cylindrical tower, 141 feet high, exhibiting, 164 feet above the sea, a *fixed white* dioptric, first-order light, visible 18 miles.

Light: Lat., $46^{\circ} 02' 49''$ N; long.,
 $1^{\circ} 24' 43''$ W.

A shelf, called the Rocher d'Antioche, sometimes known as Les Antiochats, extends $1\frac{1}{2}$ miles NNE. from Chassiron point. Several of the heads uncover at low water, and a large iron beacon has been built near its extremity, painted *red*, with a house or box at the top for shipwrecked sailors.

Rocher d'Anti-
oche.

Beacon.

A semaphore stands about 220 yards westward from the light tower on Chassiron point. The dwelling is painted greenish gray. Geographical number B. G. Q. N.

Signal station.

From the eastern shore of the island extensive sand and mud banks project, which uncover at low water.

Perrotine
light: Lat., 45°
 $58' 15''$ N.; long.,
 $1^{\circ} 13' 55''$ W.

On the extremity of the southern jetty of the canal of La Perrotine, 6 miles W. by N. from the mouth of the Charente, and $5\frac{1}{2}$ NNW. from Le Château, is a *fixed white* catoptric, fourth-order light, visible 5 miles, displayed 20 feet above water from an iron column 17 feet high.

Château
lights: Lat., 45°
 $53' 06''$ N.; long.,
 $1^{\circ} 11' 39''$ W. S.
light.

In the port of Le Château, on the scarp of the citadel, near the gate of the dock, is a circular tower, 7 feet high, showing a *fixed white*, dioptric, fourth-order light, 33 feet above sea-level. Another round tower, 59 feet high, 261 yards NW. $\frac{1}{4}$ N. from the first, exhibits a *similar* light 77 feet above the sea. Both lights are visible 8 miles, and, in line, lead into the harbor.

Lights on south
bank of the Cha-
rente.

On the southern side of the entrance to the Charente river are 2 *fixed red* catoptric lights, visible 9 miles when between the bearings S. 30° E. and S. 60° E.; one, in latitude $45^{\circ} 56' 52''$ N., longitude $1^{\circ} 04' 14''$ W., is exhibited 17 feet above the sea, from a square *white* tower 20 feet high. The other, 536 yards SE. from the former, is exhibited 44 feet above sea-level from a similar tower 44 feet high.

Lights on north
bank of the Cha-
rente.

On the northern side of the entrance are also 2 lights. The northernmost one in latitude $45^{\circ} 57' 58''$ N., longitude $1^{\circ} 04' 27''$ W., is *fixed green*, catoptric, 25 feet above sea-level, exhibited from a square *white* tower 37 feet high. It illuminates an arc of 36° , being visible when between the bearings of S. 47° E. and S. 83° E. From a similar tower 55 feet high, 656 yards SE. by E. $\frac{3}{4}$ E. from the former, is shown a *fixed red* dioptric light, 45 feet above the sea, visible in the ESE. through an arc of 18° . A *red* ray is also thrown on the Port des Barques. Both lights are visible 11 miles.

Light on Aix
Island: Lat., 46°
 $00' 36''$ N.; long.,
 $1^{\circ} 10' 44''$ W.

In the fort on the southern point of l'Île d'Aix, $2\frac{2}{5}$ miles W. $\frac{3}{4}$ N. from Pointe de l'Aiguille, the western extremity of the northern side of entrance to the Charente, displayed from a circular turret 45 feet high, is a *fixed white*, dioptric, fourth-order light, 66 feet above sea-level, visible 10 miles.

Signal station.

There is also a signal-station on the west shore of Aix island, the geographical number of which is B. G. Q. P. The tower is yellow.

Coast to La Ro-
chelle.

At a distance of 7 miles north of Aix island is the Pointe des Minimes, the southern side of the entrance to La Rochelle. The coast between the latter and the mouth of the Charente

is low, nowhere exceeding 32 feet in height, with the one exception of point Chatellaillon, which is about 50 feet high, and is marked by the ruins of an old tower. From the base of the cliffs extend rocky shoals; in the numerous bays open to the sea the bottom is sandy, except under Aix island, where it is mud.

At La Rochelle there are two harbor lights.

On the east quay is the *Fanal d'Amont*, an octagonal white tower, 72 feet high, showing, at 79 feet above water, a *fixed white*, dioptric, fourth-order light, visible 10 miles.

La Rochelle
Lights: Lat., 46°
 $09' 25''$ N.; long.,
 $1^{\circ} 09' 03''$ W.; and

SW. by W. $\frac{1}{4}$ W., 257 yards from the *Fanal d'Amont* is the *Fanal d'Aval*, a circular tower painted white, except the part toward the passage, which is red; this tower is 44 feet high, and exhibits, 46 feet above water, a *fixed red*, catoptric, fourth-order light, visible 9 miles, through an arc of about 15° each side of the range.

Lat., $46^{\circ} 09' 22''$
N.; long., $1^{\circ} 09'$
 $11''$ W.

NW. $\frac{3}{4}$ N., $1\frac{1}{3}$ miles from the Pointe de Chef-de-Baie, the northern side of La Rochelle bay, is the Pointe de Saint-Marc, $1\frac{1}{2}$ miles to the westward of which is the Pointe de Sablanceaux, the eastern extremity of l'Île de Ré. This island is low and sterile, devoid of pasture or cultivated lands, and in a great many places covered with salt marshes. There are, however, several thriving vineyards. The total length, ESE. and WNW., is 14 miles; the breadth is extremely variable, not exceeding 3 miles, the western part being only connected with the remainder by an isthmus 100 yards wide.

Ré island.

The island is situated on an extensive plateau, and from point des Baleines, the western extreme, a reef extends $2\frac{1}{2}$ miles to the northwestward, and running along the southern coast projects 2 miles to the southeastward from the Pointe de Chanchardon, 4 miles from Baleines point, and continues, varying in width from one-third to $1\frac{1}{3}$ miles, to the Pointe de Chauveau, the SE. extremity of the island, from which it extends three-fourths of a mile to the southward and eastward on the plateau of the same name.

Dangers.

The northern side is very much cut up by bays and inlets, and affords several good anchorages, but the southern side is devoid of shelters from the heavy south or SW. seas.

The population of the island is 18,000, the majority of the

Population.

inhabitants being engaged in fishing, in the salt manufactories, and in the distilleries.

Chauveau
light: Lat., 46°
 $08' 02''$ N.; long.,
 $1^{\circ} 16' 31''$ W.

On the reef extending from Chauveau point, is a circular tower, 75 feet high, from which is exhibited, 59 feet above the sea-level, a *fixed white* light, with a *red* sector covering all rocks on the south coast of the island as far as to the westward of point Chanchardon. It is a dioptric, third-order light, visible 14 miles.

Baleines light:
Lat., $46^{\circ} 14' 40''$
N.; long., $1^{\circ} 33'$
 $46''$ W.

On Baleines point is an octagonal tower, 164 feet high with square dwelling, showing a *white revolving* light, 166 feet above sea-level, visible 24 miles. It is a dioptric light of the first order. Interval of revolution one-half *minute*. The eclipses are not total within 10 miles. A life-boat is stationed here.

Life-boat.

Signal-station.

There is a semaphore 200 yards SSW. from the light-tower, with yellow dwelling. The geographical number is B. G. Q. H.

Haut Banc du
Nord light: Lat.,
 $46^{\circ} 15' 50''$ N.;
long., $1^{\circ} 35' 18''$
W.

On the shoal extending to the northwestward from Baleines point, $1\frac{1}{2}$ miles from the light on the latter, is a cylindrical tower, 96 feet high, showing a *fixed white*, dioptric, third-order light, 75 feet above sea-level, visible 14 miles. This is frequently called the Baleineaux light.

Caution.

The rocks extend over 1 mile beyond this light.

Pointe du Fief
lights.

On Fief point, the western side of the entrance to the Mer du Fief, are two leading lights. One, in latitude $46^{\circ} 14' 02''$ N., longitude $1^{\circ} 29' 00''$ W., is *fixed green*, 36 feet above sea-level, displayed from a window in the keeper's dwelling. At 370 yards N. 78° E. from it is a *fixed white* light, 28 feet above sea-level, exhibited from an iron post.

Both lights are visible 5 miles.

St. Martin
light: Lat., 46°
 $12' 28''$ N.; long.,
 $1^{\circ} 21' 58''$ W.

On the salient angle of the demi-bastion, 109 yards to the eastward of the entrance to Saint-Martin harbor, is a circular turret, 37 feet high, showing a *fixed red*, fourth-order, dioptric light, 56 feet above sea-level, visible 7 miles when between the bearings S. $78^{\circ} 27'$ E. and N. 56° W. through south.

La Flotte
light: Lat., 46°
 $11' 19''$ N.; long.,
 $1^{\circ} 19' 27''$ W.

On the new mole of Port de la Flotte, 2 miles SE. from Saint-Martin, is a *fixed white*, dioptric, fourth-order light, 33 feet above sea-level, visible 9 miles, exhibited from a circular turret, 28 feet high. This light is only visible when between the bearings of S. $\frac{3}{4}$ E. and SW.



Grouin du Cou Light from seaward.

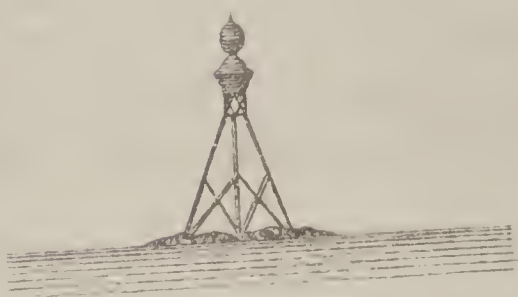


Grouin du Cou Light from the South.



Baleineux Light

Balaines Light



Beacon of Antioche



Chassiron Light

The plateau of Roche Bonne, one of the most dangerous spots on the west coast of France, is a rocky shoal about 6 miles in length NW. and SE. The change of depth is very abrupt on the seaward face, and a tremendous sea is the consequence, vessels often having had their decks swept while in 15 fathoms water. The plateau has three principal heads:

Plateau of
Roche Bonne.

1. La Congr  e, which is $3\frac{1}{2}$ miles W. by N. from the light-ship, with a depth of $2\frac{1}{2}$ fathoms at low water. In a heavy sea the rock shows among the breakers, and in smoother weather the kelp growing there is visible.

La Congr  e.

2. Pierre Lev  e, 1,040 yards SE. of La Congr  e, which has two heads, covered with $4\frac{3}{4}$ and 5 fathoms respectively.

Pierre Lev  e.

3. Roches Sem  es, or the SE. plateau, which is $1\frac{1}{4}$ miles SW. from the light-ship, and which has four heads, over which at low water are depths of $4\frac{1}{2}$, 5, $5\frac{1}{2}$, and 6 fathoms respectively.

Roches Sem  es.

Between all these spots and throughout the entire bank the depths vary from 11 to 22 fathoms. Their vicinity is marked not only by the broken sea, but by the tide-rips.

Soundings to the eastward of the plateau show sand and seaweed, and to the westward, coarse yellow sand and broken shells. Sometimes after a heavy sea the rocks themselves are temporarily covered with sand to a depth of nearly 1 inch.

Soundings.

The rocky heads extend to the eastward of the meridian of the light-ship, and to the northward of its parallel. On the old charts, the detached bank NW. of Roche Bonne was called the Banche Verte; the bottom there is nearly on a level with the adjacent sands, and consists of a species of slaty stone partially decomposed. On the plateau proper similar specimens are sometimes brought up. But the heads are of gneiss (feldspar and mica) and very hard. The white rock visible on La Congr  e is more probably quartz than coral.

The tidal currents run strong over the plateau of Roche Bonne—about 2 knots at springs. Slack-water ebb does not take place until 2 hours after the tide has commenced rising, and is the only slack-water. During the remainder of the flood-tide the current sets S. and SSW.; at high water it runs SW., changing to W., NW., and N. during the ebb. The resultant of all these is a general current

Tidal currents.

to the W. or WSW. with the land-breeze, and NW. with a southerly breeze. With the wind from W. or NW. the current is feeble, but the sea is very short.

Tides. It is high water, full and change, at 5^h 30^m. Springs rise about 14 $\frac{3}{4}$ feet.

Pilots. Pilots frequently anchor near the light-ship to watch for vessels.

Roche Bonne light-vessel: A light-ship, painted *red*, with two masts surmounted with skeleton-balls, is moored off the east side of the plateau of Roche Bonne, in 26 fathoms water, and shows 2 *fixed white* catoptric lights, 46 and 33 feet respectively above the water-line, and visible 10 miles.

Lat., 46° 12' N.;
long., 2° 20' 50'' W.

Fog-trumpet. During foggy weather blasts are given from a compressed-air trumpet, lasting about 3 *seconds*, at intervals of 14 *seconds*. Under favorable circumstances they are heard 6 miles.

Caution. Mariners are warned against placing too much dependence on the light-ship always retaining her position.

General directions for approaching the pertuis. The pertuis are generally approached on the parallel of Chassiron, because the greater number of vessels entering are bound for La Rochelle or Rochefort; otherwise the parallel of Baleines light may be taken.

Soundings. Coming in from seaward on the parallel of 46° 03' N., a vessel will first find bottom in 178 fathoms water, at 120 miles from Chassiron. The depths then decrease rapidly, and at 100 miles are only 82 fathoms, after which the soundings are very regular.

Rules for finding distance from the coast. Between 82 and 54 fathoms, the distance from Chassiron is found in miles by deducting 50 from the depth in metres. Between these limits the lines of equal soundings run parallel to the coast. In depths of 27 to 54 fathoms the distance from the coast may be found by deducting 3 from one-half the depth in metres. Both of these rules will give a result correct to 1 to 2 miles, but the latter is only applicable on, or south of, the parallel of Chassiron; farther north the rocks of Roche Bonne deflect the lines of soundings of 25 to 27 fathoms. The rules may prove very useful in case of nearing the coast in thick weather, and with only approximate longitude.

Approaching the Pertuis d'Antioche. In fair weather, entering the Pertuis d'Antioche is a very simple piece of navigation, as the course for Chassiron

brings a vessel within the range of visibility of Roche Bonne light-ship. In the night, therefore, it is easier to verify position than in the day. In either case the light-vessel should be passed about 5 miles to the northward.

Having passed the light-ship, steer for the opening of the Pertuis d'Antioche, and Baleines light will soon be made, and shortly after, when in 23 fathoms water, that of Chassiron will be sighted. If coming from the westward on the parallel of the latter, shape a course to pass 3 miles north of it; if coming from the southward, keep well off shore, and while doubling it give it a berth of several miles.

In daytime, of course, the light-towers will not be seen as far as the lights at night; but they are sometimes visible 15 and 16 miles. They are distinguished from each other by the Baleines tower being octagonal, and having a tower to the northward and a semaphore to the southward, while that of Chassiron presents the appearance of a column, and has only a semaphore west of it. Other distinctive marks, when not more than 10 miles away, are the beacon on the Rocher d'Antioche off the one, and the Haut Bane du Nord light-tower off the other.

In thick weather the Pertuis d'Antioche may be ap-^{In foggy weather.}proached and entered by the sole aid of the lead, giving the depth and nature of bottom. On the parallel of Chassiron mud will be found first in 65 fathoms, (outside which the bottom is sand,) that is, 68 miles off shore. In 45 fathoms, 37 miles from the coast, this mud will disappear.

On the parallel of Baleines point, and to the northward of it, the mud bottom will first be met with, and lost again at about the same distances from the shore, that is, 68 and 40 miles, but the depths will be greater, being of 68 and 50 fathoms.

South of Chassiron, on the parallel of the Pertuis de Maumusson, muddy bottom will first be found in 55 fathoms 50 miles off shore. Still farther to the southward it will be found in 49 fathoms, and south of the mouth of the Gironde there are no traces of it. With these figures a rough estimate can be made of the latitude.

This estimate may be brought within narrow limits by considering the part of the current of the Gironde that sets

to the westward. It is known that this current, with depths of $16\frac{1}{2}$ to 19 fathoms, is limited in the north by the parallel of $45^{\circ} 50' N.$ If the ship be kept heading for the shore to depths of 16 fathoms, if the depths and nature of bottom be carefully examined, it will be known that she is in the current, and more or less south as the mud is found rare or otherwise; and that she is north of the Pertuis de Maumusson if sand be found in 16 fathoms after crossing sand and mud.

If position be found to be in the stream of the Gironde.

If in the muddy stream of the Gironde, as shown by the lead, the course should be shaped NNW. on reaching $16\frac{1}{2}$ fathoms, keeping the same depth, mud bottom; when the lead brings up sand, the position will be very nearly latitude $45^{\circ} 50' N.$, longitude $1^{\circ} 32' W.$ Steering north, then, the depths will be from 11 to 16 fathoms, sand, gravel, and, in a few spots perhaps, loam.

Caution.

The same caution is repeated here that was given above, that is, to beware the inshore set of the tide off the Pertuis de Maumusson.

If not drifted about, after making 12 miles on the north course, $9\frac{1}{4}$ fathoms will be found, bottom of very fine yellowish-gray sand, with small transparent particles of quartz. Three and a half miles farther on the depths will suddenly increase, the bottom will be of yellow sand, less fine than the preceding; the ship is then at the entrance to the Pertuis d'Antioche, and may head in east and E. by S.

If north of stream of Gironde.

Approaching the coast, if sand should be found in $16\frac{1}{2}$ fathoms, which would indicate a position north of the muddy stream, it would be advisable to run south to establish the position with certainty, and then work north as directed above. The 16-fathom line making a slight angle with the meridian, an error of 5 miles in the estimated point of leaving the stream would make but little difference as to the point of striking the bar of the pertuis.

Classification of bottoms at entrance.

The bottom in the entrance, off the bar of the pertuis, may be divided into four distinct zones: 1. The southern portion, near the rocks of the coast, and running up to the parallel of the Antiochats, is formed of very fine sand, mixed with transparent grains of quartz. 2. The central part of the bar is composed of yellow sand, the grains irregular in shape, and about 1 millimetre in diameter, with a

little broken shell. 3. The portion near the Ile de Ré is also very fine sand, but rather more slaty. 4. In the *fosse* there is sand, rock, and stone bottom, with greater depths than elsewhere.

If by some error the meridian of $1^{\circ} 36' W.$ were followed Caution. to the northward instead of that of $1^{\circ} 32' W.$, the mistake would be shown by having $16\frac{1}{2}$ fathoms for several miles, and also by the bottom changing first to mixed colored sand, and then to very fine gray, slaty sand. The ship would then be to the northward of the entrance, and should steer ESE. for it. Such a mistake would not be likely to be made, as it could only result from an error of 10 miles in the latitude, or $3\frac{3}{4}$ fathoms in the soundings.

If a vessel were drifted inshore by the tide, or if a meridian were followed too close in, a warning would be had in the depths diminishing and the bottom becoming rocky. Caution. The ship's head should then be laid NW. to skirt the Plateau des Chardonnières.

It will not do to place too much dependence on the bot. Caution. tom shown by any one cast of the lead, unless rock be found. A mean of several may be relied upon.

Approaching this portion of the coast of France, a ship Currents in the
offing. will be influenced not merely by the general northerly current, but also by tidal currents. In the offing between the parallels of the Gironde and the Barges d'Olonnes, they change with the sun, or in the direction of the hands of a watch, round the entire compass. At low water, 20 miles off shore, the flood sets north; abreast the entrance to the pertuis, ENE.; and near the shore, north. This current is feeble off shore, but increases in strength on approaching. At high water the current sets south, with but little strength. The ebb there sets SSW., and, increasing in strength, SW. in the distance, and WNW. off the entrances. Advantage may be taken of these differences of direction in beating in or out.

Having passed the bar at the entrance to the Pertuis Pertuis d'An
tioche. d'Antioche, and reached the deeper water inside, if the destination be La Rochelle or Pallice anchorage, steer E. $\frac{1}{2}$ S., having Chauveau light one point off the port bow. Run on this course until that light comes in line with Pointe de Sablanceaux beyond, N. 22° E., and steer N. 59° E., for La

Rochelle. The last course leads to the plateau of Lavardin, which is steep-to. If bound to the northward, starboard the helm when Lavardin tower and the mill of La Repentie are in line; if bound to La Rochelle, keep the lower of the two harbor-lights a little open to the southward of the higher.

Soundings. While in the Pertuis d'Antioche, the soundings will show if a ship be in good position; the sand near the outer bar will change to mud and loam, while the depths will increase from 11 to 22 fathoms. In clear weather the beacon on the Rocher d'Antioche will be seen, and should be passed $2\frac{1}{2}$ miles to starboard.

At night. It is easier to pilot through the Pertuis d'Antioche at night than in the day-time, because not only are the lights distinguished more easily than their towers, but the *red* ray of Chauveau light will warn a vessel if too close to the rocks near the Ile de Ré. After passing to the eastward of the meridian of Chassiron, a vessel should keep to the northward of the alignment of the *red* light on the north bank of the Charente, and the *white* one of Aix island. When La Rochelle bears N. 59° E., its *red* and *white* harbor lights will be in line, leading into the harbor.

Tidal currents. The current of the flood-tide sets more strongly along the coast of Oléron island, and that of the ebb near Ré island. In mid-channel, the turn of the tide is one hour after low water, and half an hour after high water. The flood runs $1\frac{1}{4}$ knots an hour, and the ebb $1\frac{1}{2}$ knots.

In foggy weather. Having arrived off the pertuis by the directions given for thick weather, keep near the 11-fathom line, which is the northern boundary of the *fosse*. A steamer can easily do this by making diagonal courses between 9 and 12 fathoms. When the 11-fathom line of soundings trends to the northward, if there be no breaking away of the fog, anchor.

Beating in. In day-time, if there be any swell, a vessel should tack in 8 fathoms on the Ré island side, or when Lavardin tower, painted with *black* and *white* bands, is well open of Pointe Sainte-Marie, or between it and Chauveau light-tower, very much nearer to the latter than to the former. At night, while to the westward of the meridian of Chassiron, keep to the southward of the *red* ray of Chauveau; after passing Chassiron, the limit of the southern boards is the alignment

of the *red* light on the north bank of the Charente, and the *white* one of Aix island, making $1\frac{1}{2}$ -mile boards to the northward of it. When La Rochelle harbor lights come in one, work up on the alignment, always keeping both lights visible.

The plateau of Le Clône, in the middle of the pertuis, never breaks, but the sea is very high on it in SW. gales. Vessels anchoring on it, even in good weather, might lose their anchors, the bottom being of hard rock. The western limit of Le Clône is given by Chauveau light-tower in line with Pointe du Plomb beyond; the eastern, by Lavardin tower just on with Pointe du Plomb; the southern by Pointe du Parc of Aix island (NW. point) in line with the tower of Fouras beyond. As the bank is only $2\frac{1}{2}$ miles SSW. from Chauveau, ships can avoid anchoring on it by bearings and distance of the latter. There is a depth of $8\frac{1}{4}$ fathoms there at low water. The centre is on the alignment of La Rochelle harbor lights.

Le Clône bank.

The Rade des Basques being open to the westward, is not a good anchorage for small vessels, because of the heavy swell that sometimes sets in.

Rade des
Basques.

To reach the Basques roads, as soon as Chassiron light bears south, bring the tower of Fouras over the centre of Aix island, S. 59° E., and keep them so until Lavardin tower is two-thirds way from point Saint-Marc to point Sablanceaux, or fort Boyard (on La Longe le Boyard bank) bearing S. $10^{\circ} 30'$ E., 14° to the eastward of Perrotine light, a little open to the eastward of the Château, on Ré island. On this cross-bearing there is anchorage in 8 fathoms, soft mud, good holding-ground.

Directions.

At night other ranges are used for making the Basques roads. When Chassiron light bears south, keep a little north of the alignment of the *red* light on the northern bank of the Charente and Aix island light, steering S. 59° E., and come to when Perrotine light bears S. 4° W., and Chauveau light N. 18° W.

At night.

In foggy weather the Basques roads are reached by making diagonal stretches across the 11-fathom line on the southern border of the *fosse*. The time to anchor is when that line trends off to the northward.

In foggy
weather.

The limits of the Basques roads are as follows: In the north, the Roche du Sud; in the east, the 5-fathom line, the

Beating in.

limit of the beating-room for deep-water ships, is with Fort Boyard bearing south; the SW. side of the plateau is given by the church-steeple of Marennnes, midway between Aix island light-tower and Fort Boyard; and the SSW. limit ($5\frac{1}{2}$ fathoms) by l'Ile Madame open to the southward of Aix island.

Farther to the southward, near Oléron island, depths of $5\frac{1}{2}$ fathoms and over are found with the beacon on the Rocher d'Antioche bearing to the westward of W. by N. until the *red* light on the north bank of the Charente comes in line with Aix island light, which limits the soundings of $5\frac{1}{2}$ fathoms off La Longe le Boyard. Farther to the SE. bring Moëse steeple over Piedemont point.

Beating in at night.

Beat up to the anchorage at night by tacking on each side of the alignment of Aix island light and the *red* one on the north side of the Charente until Chassiron light bears W. and Chauveau light N.; when keep to the northward of the alignment. The stretches should not extend much to the southward of the alignment at any time.

Rade de l'Ile d'Aix.

The Aix Roads are the continuation to the southward of the Rade des Basques. Men-of-war ordinarily anchor here when bound for Rochefort or when preparing for sea. It also offers a good shelter and excellent holding-ground for vessels in bad weather.

Directions.

To make this anchorage during the day, steer S. 59° E. for Fouras over the centre of Aix island, from the time that Chassiron bears S. When Fort Boyard comes in line with the steeple of Marennnes, S. 22° E., port the helm and steer S. 48° E., with Aix island three-fourths point off the port bow. When the ruins on Chatellaillon point open from point Coudepont, the eastern extremity of Aix island, let go in 8 to 10 fathoms water. If a less depth be desired, keep on to the mooring-buoys, where $4\frac{1}{4}$ fathoms will be found, mud bottom.

At night.

At night come in on the alignment of Aix island light and the *red* light on the north bank of the Charente, until Perrotine light passes behind, and is masked by, Fort Boyard; then steer S. 30° E. for 1 mile, and anchor in $8\frac{1}{4}$ fathoms, mud bottom, with Aix island light bearing N. 70° E., and the *red* and *green* lights on the north bank of the Charente in line.

Near the Aix island side of the roads the shoals are steep-
to, but the beacon of Tridoux, on the WSW. edge of the reef, Limits.
should not be approached nearer than 600 yards. Moëse
steeple over the fort on Madame island gives the $5\frac{1}{2}$ -fathom
line to the southward of Pointe Catherine, the southern ex-
treme of the island. On the southern border of the an-
chorage the $5\frac{1}{2}$ -fathom line is given by Fort Boyard in line
with Saint-Denis steeple beyond, and also by the large
windmill of Fouras on with the angle of the fortifications of
Fouras.

Soundings of $16\frac{1}{2}$ feet are limited in the S. by Moëse
steeple barely open to the southward of Piedemont; in the
W. by the *black* iron beacon of Jamblet (350 yards from the
extremity of the reef off the NW. point of Aix island) well
clear of Aix island; and in the SE. by Perrotine light-
tower on with Saint-Pierre steeple.

In the 5-fathom depths is a rock, covered with $4\frac{1}{2}$ fathoms, Rock.
which should be avoided in anchoring. Its marks are
Fouras windmill open from Fouras point, the *lanterne* of
La Rochelle touching the outer rampart on Aix island, and
Moëse open to the southward of Piédemont point.

The bank called La Longe le Boyard is a sandy shoal off Bank of La
Longe le Boyard.
the Pointe des Saumonars, extending $5\frac{3}{4}$ miles NW. and
SE. The soundings on it vary from 1 to 3 fathoms, but be-
tween it and Oléron island there is a channel with a least
depth of 4 fathoms; on the eastern border is Fort Boyard, a
useful landmark.

On the SE. end of La Longe bank is the Roche du SE., Roche du SE.
a plateau, the shoalest spots of which are 2 fathoms under
water. The eastern extremity of the shoal is given by Aix
island flag staff open to the westward of the light.

The northern part of the deeper water between La Longe
and Oléron island, is called the Rade des Saumonars, and
the part SE. of the Pointe des Saumonars, the Rade des
Trousses.

To enter the Saumonars roadstead from the Pertuis Rade des Sau-
monars.
Directions.
d'Antioche with $4\frac{1}{4}$ fathoms at low water, steer S. 5° W. for
the steeple of Saint-Pierre on with a cluster of trees. To
beat in, keep nearer to the shore of Oléron island than to
the bank. The $2\frac{1}{2}$ -fathom shoals near the former are

avoided by keeping Moëse steeple a little open of the low point of Saumonars.

Rade des Trousses. Two channels lead from Aix island anchorage to the Rade des Trousses; both have $4\frac{1}{2}$ fathoms at low water, but the eastern is the more direct, and the one generally used.

Directions. To follow the channel, after leaving Aix island roadstead bring the flag-staff on that island exactly behind the light-tower, in line astern, and keep it so, steering S. 3° W., until the house on Fouras heights bears N. 82° E., in line with the southern angle of the fortifications. Then port the helm and head for the mooring-buoys, about W. $\frac{3}{4}$ N.

With ebb-tide. If the ebb-tide be making strong, steer S. 80° W. after completing the first course, (S. 3° W.,) until the NW. mooring-buoy passes in line with Saumonars point, when head up for it.

Anchorage. The best anchorage is near the mooring-buoys, and SE. of them, in $6\frac{1}{2}$ fathoms water, sand and mud. Saumonars point gives a lee from the westerly swell, and the bank of La Longe le Boyard breaks the NW. sea.

Currents. The currents are feeble, and both flood and ebb are felt here half an hour before they are in the Aix roads.

Compass station. The four mooring-buoys may be used for compass-buoys, having the steeples of Marennes and Sainte-Marie for bearings.

Charente river. The river Charente rises in Haute Vienne, and, after a circuitous course, passes into Charente Inférieure, and falls into the SE. angle of the Pertuis d'Antioche. Its principal tributaries are the Tardoire, Touvres, Né Seugne, Antoine, and Boutonne. Its current is rapid, and it frequently overflows its banks. The total length of the river is about 200 miles, and it is navigable for small craft for 60 miles, to Montignac. A little above Rochefort two canals, the Brouage and Charas, lead off, the one from the left and the other from the right bank, to drain the salt marshes round the city, which were a fruitful source of disease to the whole district.

Tides. The question of tides is of the greatest importance in the navigation of the Charente, as upon them depends entirely the communication between Rochefort and the sea. Springs sometimes rise $20\frac{1}{2}$ feet, at Rochefort; ordinary springs rise 17 feet, and neaps 13 feet.

During the highest springs, the current at Martroux ($1\frac{1}{2}$ miles below Rochefort) runs $3\frac{9}{10}$ knots at half-ebb, and $3\frac{2}{5}$ at half-flood. Above and below that point the strength is less. At nearly high water, when vessels begin to ascend the river, the mean velocity of the flood is about 2 knots.

Tidal currents.

It is slack water of either tide for 30 minutes at the mouth of the river, and for 15 minutes at Martroux, at full and change. The ebb-tide commences to make along the banks 10 minutes before it does in mid-stream. It sometimes happens that the flood-tide does not make on the surface at all, and vessels at anchor will tail up-stream, while their boats will be riding to the ebb.

Between Rochefort and Aix island the differences in height of high water are but small under ordinary circumstances. At the full and change the flood-tide is propagated with a level surface. The time of greatest superelevation of the upper waters is about 60 hours before the first and third quarters of the moon.

High water.

When there is a freshet in the river the water at Rochefort is fresh at high tide, and several inches above the level at the entrance. The latter also occurs when a high wind blows into the funnel of the mouth; but generally no higher water can be counted on at Rochefort than that at Aix island, given for every day in the *Annuaire des Marées*.

The figures in the latter are liable to some correction, due to the influence of wind and barometric pressure. These two causes combined may make a difference of 19 inches additive.

Caution.

A knowledge of the hour of high water at Rochefort may be as important as the height. It is high water, full and change, at $4^h 6^m$. To find the time on any day, enter the following table, which gives for each month and corresponding to the moon's parallax on the second day previous to the one in question, the number of minutes to be added to the time of high water at Aix island, given for every day in the *Annuaire des Marées*.

Table for the interval of propagation of flood-tide between Aix island and Rochefort.

Months.	☾ Parallax.							
	54'	55'	56'	57'	58'	59'	60'	61'
Winter:	<i>m.</i>	<i>m.</i>	<i>m.</i>	<i>m.</i>	<i>m.</i>	<i>m.</i>	<i>m.</i>	<i>m.</i>
December	10	11	12	14	17	21	25	29
January, November	14	15	16	18	22	25	29	33
February, October	20	21	22	24	27	30	34	38
March, September	24	25	26	28	31	35	39	43
Summer:								
April, August	22	23	24	26	29	33	37	41
May, July	19	20	21	23	26	30	34	38
June	17	18	19	21	24	28	32	36

The figures are for the 15th of each month. For other days interpolate from the table, and to the result, for morning tides, add 3 minutes during winter-months, and subtract 3 minutes during summer-months; for evening tides, *vice versa*.

Low water. With the moon quartering, the level of low water at Rochefort is below that of Aix island, while at the full and change the inverse is the case. In winter, during a freshet, it may be as much as 6½ feet higher at Rochefort than at Aix island.

Bar. On the outer bar of the river abreast of Fouras is a depth, at low water, of only 2 feet. But the bottom is such soft mud that vessels in tow have dragged through 2¼ feet of it; so that the depth may be considered practically 4 feet.

Off fort Lupin is another muddy sill, with the same depth of water on it; but the bottom here is firmer, and the depth should only be called 3¾ feet.

Still farther up, at Charas, the practical depth is only 2¾ feet.

Entering. As all these bars must be passed in one tide, the entrance should be so timed as to be on the latter at high water.

Directions for ascending the Charente. It would be advisable to trim ship to reduce the draught as much as possible on approaching the mouth of the river. The best time to leave Aix island anchorage is between 1 and 1½ hours before high water, and the height that it will attain is found by adding 1¾ feet to the height observed 1¾ hours, and 1¼ feet to that observed 1¼ hours, before high water.

Caution. The speed of a vessel should not exceed 6 knots, as the

current of the tide would increase it to 8, and a higher rate would not be safe in so tortuous a channel.

Leaving the Aix roads shape a course S. 65° E. to the right of Fouras, keeping the two light-towers on the north bank in line. When abreast the redoubt of l'Aiguille, port the helm and steer SE. for the two light-towers in line on the south bank, to the eastward of the Port des Barques, until abreast the beacon off the latter, an approach to which is indicated at night by a *red* ray from the upper light on the N. bank. Then starboard gently and bring the beacon gradually in line astern with the south end of l'Île Madame.*

After passing the lower light on the left bank (southern bank) starboard the helm a little, and cross the river diagonally, until within 220 yards of the grassy right bank, keeping at this distance from it until abreast fort Lupin, when cross the river again diagonally, and follow the left bank at a distance of 165 yards until above the beacon of Parpagnole. Then port the helm a very little off the Pointe de la Sablière and once more cross over very obliquely to the right bank, heading for the farm of Charas, and keep 175 yards from the grass while rounding the "pointe sans fin," or about two-fifths the width of the river from the right bank.

In this bend there will be found a strong set toward the northeast bank, and it is better to lose a few inches of depth near the middle of the river than run the risk of going on the stony beach at Charas or the mud above. Caution.

From abreast the wharves on the right bank at Vergeroux, keep in mid-stream until opposite the mill of La Prée on the eastern bank and the channel of Grandes Prises on the western, and keep 45 to 55 yards from the former. From Soubise keep in mid-stream to Martroux, where the rocks of l'Avant Garde are met, when skirt the right bank very close, particularly abreast the mouth of the canal 820 yards above the road from Rochefort to Royan. The channel here is only 27 yards wide and is in the alignment of

* A red buoy, surmounted by a circular staff with a pyramid, and bearing the words "Les Palles" in white letters, will be passed to starboard in entering the channel. The buoy is on the following bearings: Maise steeple in line with the two chimneys of the Piedmont guard-house; the NW. part of fort d'Enet well open from the SE. point of Le Chatellaillon.

two chimneys in Martroux. Above this point keep in mid-stream up to the city.

Descending the river.

Descending the river must be done on the last of the flood, so as to reach the bars at high water.*

Between the rocks of l'Avant Garde, at Martroux, and the elbow of Charas, the speed should be about 6 or 7 knots. Below Charas, a vessel towed, or a side-wheel steamer, may go at full speed, but a propeller should not if her keel be in the mud.

Rochefort harbor.

Rochefort harbor is capacious and deep enough for the largest vessels; it is divided into two parts, for men-of-war and merchantmen respectively.

Port Militaire.

The former, called the *Port Militaire*, begins at the channel of the powder-magazine. It has docks large enough for any vessel that can ascend the river. The sill of the new one is 3 feet 10 inches below the zero of Aix island. The dock-yard, especially when overcrowded, forms a certain impediment to the free entry and exit of vessels. The difficulty was formerly considerable, but beneficial improvements were effected in regard to these matters by a set of regulations that came in force in October, 1872. Passes are no longer required, and the sea-pilots can convey inward-bound vessels to their destination, pilots in charge of outward-bound vessels conducting them through the dock-yard, and being relieved generally at Soubise by the sea-pilots.

Port Marchand.

The *Port Marchand* is above the man-of-war anchorage. In it vessels anchor along the right bank, from the channel of the dock to above the *cabane carrée*.

City of Rochefort.

Rochefort, in the department of Charente-Inférieure, is situated on the right bank of the Charente, 10 miles from its mouth, partly on a hill and partly on a marshy plain. In form it is semicircular, and inclosed, on the land side, by ramparts. It is altogether modern. The streets are broad and regular, many of them planted with rows of trees, and the houses, though low, are in general very handsome. The most conspicuous edifice is the large naval hospital on an eminence outside the town. There is railway communication with Paris by Poitiers, also with La Rochelle.

* The Direction du Port says: "A large vessel should depart when the tide has reached a height of 1 metre less than the ship's draught."

Rochefort derives its chief importance from its naval *arsenal*, which is considered the third of its kind in France. Dock-yards, sail-lofts, rope-walks, biscuit-manufactories, storehouses, naval schools, and other establishments are to be seen. Ship-building is one of the principal industries. There are also sugar and vinegar works.

Industries.

The population of Rochefort is about 29,000.

Population.

The exports from Rochefort lately have been insignificant in the foreign trade. This arises not from deficiency in commercial activity, but from foreign imports, and from exports for French consumption. Many vessels arrive with cargoes of coal and other merchandise, but generally leave in ballast, either to load brandies at Tonnay-Charente or iron-ore at Bilbao.

Commerce.

Brokerage on a vessel in ballast, outward, $6\frac{2}{3}$ centimes per ton of cargo; if loaded in and out, 5 centimes per ton. Port dues, $1\frac{1}{2}$ francs, and quarantine dues 10 centimes, per ton. River charges about $2\frac{1}{2}$ centimes per ton; loaded, $12\frac{1}{2}$ centimes per ton. In case men are required to haul the vessel through the dock-yard they are paid 2 francs each.

Expenses.

The navigation of the Charente above Rochefort is very simple. In case of head winds vessels club up or down with the tide.

River from Rochefort to Tonnay-Charente.

Near the point of the Grand Fret there is a rocky shoal, with $2\frac{3}{4}$ fathoms, in mid-stream. The anchor should be hove off the ground on approaching it, or the flukes will catch.

Caution.

Above that is a ledge, called the Banche de Toyaux, near the Maisonnnette, with $11\frac{3}{4}$ feet on it. To avoid it, hug the left bank, which is concave there.

Banche de Toyaux.

Near the lower part of the anchorage of Tonnay-Charente is another shoal, before reaching which, while going up with the flood-tide, some more chain should be hove in.

The anchorage of Tonnay-Charente is comprised between two stakes, one below the suspension bridge and the other below the promenade. The deepest part is between the custom-house barracks and the watch-tower. Vessels drawing $16\frac{1}{2}$ feet will remain afloat off Tonnay-Charente. Those drawing $19\frac{1}{2}$ anchor in a hole off the promenade.

Anchorage of Tonnay-Charente.

At low tide the water here is fresh and pure.

The foreign trade of Tonnay-Charente is principally Eng-

Commerce.

lish, and has progressed enormously since 1864, the increase in tonnage of British ships alone, between that year and 1874, being from 26,000 to 76,000 tons. It is of the simplest character, consisting virtually of the import of coals and the export of brandies, and is conducted in a very quiet manner under perfect organization. The value of brandy exported is \$16,800,000 per annum.

Martrais bay. Martrais bay, on the south side of Ré island, formerly communicated with the Mer du Fief on the north side. It is open between the reefs extending from points Couarde and Chanchardon. Only small vessels can enter, the depth being $6\frac{1}{2}$ feet.

P o i n t e de Chauveau. During the day-time the $5\frac{1}{2}$ -fathom line, off Chauveau point, is given by the tower of Lavardin, open 4° to the right of the church-steeple of Lalen. At night the same is shown by the *white* light of La Rochelle being hidden behind the tower on the south side of entrance to the harbor. The $2\frac{3}{4}$ -fathom line is shown in the day by the tower of Lavardin well on with point Chef-de-Baie, and at night by the re-appearance of the *white* light of La Rochelle.

Rocks. The limits of the rocks of the Plateau de Chauveau is given by the light-tower on their edge and the beacon of Chauveau, one-half mile west of it. Three hundred yards to the ENE. of the light is the beacon of Greffe, 200 yards NW. of the outer rocks.

To reach the Pallice anchorage. Vessels seeking shelter during the day under the lee of Ré island, leave the course N. 59° E. for La Rochelle as soon as Lavardin tower and the mill of La Repentie are in one, steering then N. 29° E. for them until one-half mile from the former; then the course is N., Sablanceaux point 1 point off the port bow, passing 400 yards from Lavardin tower, until the latter is in line astern with Fort Boyard on La Longe le Boyard, which range will take the vessel beyond Sablanceaux. The anchor may be let go as soon as Richelieu tower is shut in by Chef-de-Baie point, the shelter being perfect from the westerly swell.

Approaching La Rochelle. In the day-time having brought the city of La Rochelle to bear N. 59° E., steer for it until the Tour de Richelieu is made in front of the city. Bring this little tower on the same bearing, in line with the larger one on the north side

of entrance to the inner harbor. This range will lead over a 3-fathom bar between Lavardin bank and l'Amour rock.

The outer anchorage is reached when Repentie point is shut in by Saint-Marc point. There is excellent holding-ground, mud and clay, in 18 and 20 feet of water on the following cross-bearings: Richelieu tower on with Saint-Nicolas church, the southeasternmost of the churches of La Rochelle; the gable of the abbey of Saint-Laurent over the middle of the isthmus of Sablanceaux; and Lavardin tower in line with the steeple of Sainte Marie on Ré island.

A vessel may anchor on the alignment of Saint-Laurent abbey with the ruins of the little redoubt on Sablanceaux isthmus, while between the ranges of Richelieu tower in line with the tower on the south side of entrance to the port of La Rochelle, and Lavardin tower in line with Chauveau light. Near the latter range the shelter is the best, being under the lee of the highest parts of the plateau of Lavardin.

In one respect the anchorage is poor; in rough weather, though there is but little danger of dragging, ships roll very heavily.

Some of the pilots take vessels nearer to Lavardin; but when that plateau breaks in bad weather, the berth is not as good as that on the ranges given above.

Approaching at night, as soon as the two harbor lights of La Rochelle are made in line, N. 59° E. from the pertuis, steer for them until Chauveau light bears N. 69° W., when Aiguillon light will suddenly be screened by point Saint-Marc. Then put the helm to starboard, and steer N. 5° E. to sight Aiguillon light again. The *white* light of La Rochelle will be hidden by the tower on the south side of the entrance to the port; when it emerges again is the time to anchor.

The bearings would be Chauveau light bearing N. 88° W., Aiguillon light N. 7° E., and the *white* light of La Rochelle N. 67° E. The bottom is mud at $3\frac{1}{2}$ fathoms.

Vessels beating up have nothing to fear at high water off La Rochelle bay except the projecting rocks off Saint-Marc point, and the point of Chef-de-Baie. The former are indicated by the beacon of the same name 55 yards from their

extremity. Chef-de-Baie point should not be approached nearer than 300 yards.

Pointe des
Minimes.

Off Minimes point the edge of the $1\frac{1}{2}$ -fathom shoals is with Saint-Marc beacon just open of the land. Large vessels can sometimes continue beating up to Richelieu tower, but after Minimes point has shut in Roux point, they should not come to the southward of the alignment of the harbor-lights of La Rochelle.

Plateau du La-
vardin.

The $2\frac{3}{4}$ -fathom line in the SW. part of the plateau of Lavardin is given by the gable of Saint-Laurent Abbey well open to the right of Rivedoux steeple. The $2\frac{3}{4}$ -fathom line off the Roche d'Amour is on the same range.

Lavardin plateau extends in the SE. to the alignment of Richelieu tower and that on the south side of the port entrance. The former in line with that on the north side of the entrance leads through in mid-channel between Lavardin and Amour banks. The $2\frac{3}{4}$ -fathom lines on the eastern edge of Lavardin and the western of Amour have Aiguillon light a little open to the westward of Saint-Marc point.

The Plateau du Lavardin frequently breaks, and the Roche d'Amour rarely.

Roche du Sud.

The Roche du Sud has $3\frac{1}{8}$ fathoms on it at low water, and is to the southward and outside of Lavardin. Its bearings are: Chauveau light N. 43° W. in line with a large house on Ré island; Richelieu tower in line with the church of Notre Dame de la Rochelle, which is seen between the cathedral and the *lanterne*. Lavardin tower on with Aiguillon light leads in clear to the SW. and W., and Richelieu tower on with Saint-Jean church in La Rochelle, clear to the NW. The mill of Pont la Pierre over Ché point leads south of it. The rock seldom breaks.

La Rochelle
roads.

Vessels drawing 13 feet can anchor in the roads of La Rochelle with Saint-Laurent abbey just outside and touching Sablanceaux point. Farther to the eastward the depths diminish and mud bottom is changed to sand.

Entering the
'port.

Vessels intending to enter the port have to wait for the tide to serve, as the bar to be passed has only 2 feet on it at low water. This bar is not in the channel inside the Digue du Cardinal, but on the bank outside. The depth of water is indicated by balls at the entrance of the basin, but

unless the weather be very clear it will be hard to make out the signal even with a glass.

It is high water, full and change, at 3^h 31^m; mean spring-rise 17 feet, neap 13 feet; mean neap range, 9 feet. The time of high water is practically the same as at Aix island, given in the *Annuaire des Marées*, as are also the heights to within 1 inch. Tides.

The two light-towers in line N. 59° E. lead up the narrow channel, and being painted one *red* and one *white* are easily distinguished. The tower of Richelieu is painted *black* and *white*, and the height of water can be approximately obtained by measuring with the eye how much of the black or white paint is above water.* Directions.

Having passed the lozenge-shaped beacon on the mole on the starboard hand, the speed should be decreased whether bound for the basin or for the old port between the two large towers. In the former case check the way of the ship by the mooring-buoy in front of the basin, and wait there until the gates open.

In heavy westerly weather the gates are not opened, in which case a vessel, if her draught will admit of it, had better enter the inner harbor.

The city of La Rochelle is encircled by fortifications, and entered by seven gates. Its broad, straight streets are lined with buildings, which, though not lofty, are generally good. The most of the town is built round the inner harbor, which is bordered with an elegant quay, shaded by rows of trees. The town hall is a fine building in the renaissance style of the time of Francis I; the cathedral, exchange, court-house, and public library are among the ornaments of the town. Many of the squares are exceedingly beautiful. City of La Rochelle.

La Rochelle contains several schools, hospitals, a botanical garden, mint, arsenals, &c.

Ship-building is extensively carried on, and the manufactories of the place include potteries, glass-works, sugar-refineries, and cotton factories. Industries.

There are two wet-docks in La Rochelle, both completely quayed on three sides. The gates are opened one-half Docks.

* The white commences at a height of 16 feet, and the black at 22, from the bottom.

hour before, and closed one-fourth hour after high water, during daylight, the fact being announced by the national ensign hoisted at the outer signal-staff.

The new dock is the larger, and is generally used for the reception and discharge of foreign cargoes. The width of the gate is 54 feet, and any vessel that can reach it can enter, the sill being 8 inches below the outer bar. One side is close to the railway station, and cars are run to the quay, so that vessels with cargo in bulk can at once discharge into them.

The old dock is built on the south side of the *vieux port*, and can only take vessels drawing $5\frac{1}{4}$ feet less than those entering the new one. The width of the gate is $38\frac{3}{4}$ feet. This dock is generally used for vessels making a long stay in port.

Vieux port. The inner harbor has 5 feet, but the mud at the entrance dries 3 feet at low water.

Gridiron. In it is a gridiron that can be used free of charge, the extremities of which are marked by beacons. The blocks of the SW. end are higher than the others, so that only one end of a ship may possibly be water-borne by the rising tide.

Population. The population of La Rochelle is about 20,000.

Commerce. The trade of La Rochelle has of late been augmenting considerably, so much so that the dock accommodation is insufficient. In 1872 the tonnage of foreign shipping entered was 52,000, and that of the coasting trade 103,000.

The imports and exports are more miscellaneous here than in any other ports in the vicinity.

Exports. The principal exports are corn, brandy, wine, firewood, salt, and others.

Imports. Coal preponderates greatly over other imports. There is a special trade in that article with Cardiff, partly conducted by French steamers; the vessels discharge at La Rochelle, and go in ballast to Bilbao and other ports, returning with iron-ore, which is sent inland to be smelted for the supply of French manufactories. Besides these two articles there is considerable importation of fish, iron rails, tar, pitch, wood, (for building purposes,) &c.

Dues and charges on a vessel of 241 tons register, cargo of coals in and ballast out : Expenses.

	Francs.	Centimes.
Pilotage in ($14\frac{1}{2}$ feet).....	113	00
Pilotage out ($8\frac{1}{2}$ feet).....	43	00
Assistance-boat, four men.....	15	00
Declaration.....	12	00
Board of health.....	24	10
Passport.....	2	10
Brokerage (50c. per ton of cargo).....	196	40
72 cartloads ballast (88 tons)	168	00
	<hr/>	<hr/>
	513	60

Labor costs 3 to $3\frac{1}{2}$ francs per day.

From Saint Marc point the coast runs to the northward and eastward, and, as far as Saint-Clément point, is composed of steep cliffs, with an occasional short beach. The only large one of these is that lining Plomb bay. From the Pointe du Plomb flat rocks extend some distance, but can be avoided, being indicated by the beacon of Le Moine. Saint-Marc point should never be shut in by La Repentie in beating. From the Pointe du Plomb the shore trends off more to the eastward, and rounding again to the westward and southward, forms the shallow bay of Aiguillon, into which fall the rivers Luçon and Marans. The western side of the entrance to this bay is the point of the same name, a long tongue of sand projecting $1\frac{1}{2}$ miles SE. The eastern side is Pointe Saint-Clément, ESE., 3 miles from the former.

On Aiguillon point, $6\frac{1}{2}$ miles N. $\frac{1}{2}$ E. from Saint-Marc, is a *fixed white*, dioptric, fourth-order light, 43 feet above the sea-level, visible 10 miles, exhibited from a *black* wooden beacon 38 feet high.

Aiguillon
light: Lat., $46^{\circ} 16' 13''$ N.; long.,
 $1^{\circ} 12' 23''$ W.

At a distance of 12 miles WNW. from Aiguillon point is the Pointe du Grouin du Cou. The coast between is concave, formed of sand-dunes of moderate height, and with sand-flats extending from it throughout. The river Lay falls into the pertuis about $4\frac{1}{2}$ miles from Aiguillon bay, after running to the southward and eastward, parallel to the coast, for some distance. The western side of the mouth is the Pointe de la Roche. The little town of l'Aiguillon is situated on its left bank, $1\frac{1}{2}$ miles from the mouth. It has no trade.

Coast.

Lay river.

The general line of this coast is parallel to the northern side of Ré island, and forms the northern shore of the Pertuis Breton.

Grouin du Cou point.

Grouin du Cou point is about 30 feet high, and is distinguished by two towers, from the taller and easternmost one of which is exhibited the light. From the point a ledge of rocks extends three-fourths of a mile WSW., outside which is sand. S. 25° E., $1\frac{1}{3}$ miles from the light, is the *Roche de l'Aunis*, which has but 2 feet on it at low water, the depths immediately outside being 3 to 5 fathoms.

Grouin du Cou light: Lat., $46^{\circ} 29' 41''$ N.; long., $1^{\circ} 27' 55''$ W.

On Grouin du Cou point, exhibited, 92 feet above sea-level, from a square *white* tower, 46 feet high, attached to the keeper's dwelling, is a *fixed white*, dioptric, fourth-order light, visible 10 miles.

The other tower on the point, to the westward of the light, is round and smaller.

The Grouin du Cou light is sometimes called La Tranche light. The settlement of La Tranche is a little over a mile to the eastward, on the Pointe de Chiquet.

Coast.

From point Grouin du Cou the coast is sandy, averaging 120 feet in height, with a few projecting rocks, and extends 16 miles in a general direction of NW. by W. to Saint-Nicolas point, the western extreme of the entrance to the port of Les Sables d'Olonne.

Perray river.

At a distance of 9 miles from Grouin du Cou point, the small stream of Perray falls into an inlet near the point of the same name, and affords an occasional shelter to coasters.

Lights of Les Sables d'Olonne.

Southeast of the town of Les Sables d'Olonne are the following two lights leading through the pass to the roadstead between *Le Nouc'h* and *Le Noura*.

Potence light.

The Potence light is a *fixed red*, catoptric light, elevated 93 feet above sea-level, exhibited from a square tower on the heights.

Stockade light: Lat., $46^{\circ} 29' 30''$ N.; long., $1^{\circ} 46' 30''$ W.

Near the beach, 420 yards S. $43^{\circ} 30'$ W. from Potence light, is that of the Stockade, which is also *fixed red*, catoptric, and is exhibited, at an elevation of 33 feet above sea-level, from a square tower.

Both lights are visible 7 miles, through an arc of 12° on each side of the line of direction, the power of the light diminishing as that line is departed from.

On the jetty head on the eastern side of the entrance to the harbor is a *fixed white*, dioptric, fourth-order light, 36 feet above sea-level, visible 8 miles, exhibited from a circular tower 25 feet high. Harbor lights:
Lat., $46^{\circ} 29' 27''$
N.; long., $1^{\circ} 47' 35''$ W;
and

On the western side of entrance to the harbor is La Chaume light, *fixed white*, dioptric, fourth order, 105 feet above sea-level, visible 10 miles, exhibited from a square tower 84 feet high. Lat., $46^{\circ} 29' 38''$
N.; long., $1^{\circ} 47' 51''$ W.

A life-boat is stationed at Les Sables d'Olonne; there is also a rocket-apparatus to send lines to vessels ashore. Life-boat.

From the port of Les Sables d'Olonne, the coast-line is convex, running to the west-northwestward five-sixths mile to the Pointe de l'Aiguille, and then trending away to the northward. Coast.

On the downs of l'Aiguille point is a semaphore signal-station, the dwelling of which is of a bluish-gray color. Geographical number, B. G. Q. D. Signal-station.

From Aiguille point a series of rocks, called the Barges d'Olonne, extend $2\frac{1}{2}$ miles to the westward, several of the heads of which uncover at low water. This reef was formerly considered one of the most dangerous points on the coast; but since the establishment of a light there, making a land-fall has not been such a source of uneasiness to captains. Barges d'Olonne.

On the Grande Barge, $1\frac{1}{4}$ miles from the coast, is a cylindrical tower 90 feet high, exhibiting, at an elevation of 75 feet above sea-level, a *fixed white* light, varied every three minutes by a *red flash*. It is a dioptric light of the third order, visible 14 miles. Light: Lat., $46^{\circ} 29' 43''$ N.; long., $1^{\circ} 50' 36''$ W.

Two hundred and seventy-five yards SSW. of the Petite Barge, or two-thirds of a mile S. $\frac{3}{4}$ W. from the light, is a bell-buoy. Buoy.

The westernmost of the shoal patches is the Basse Verme-nou, with $25\frac{1}{2}$ feet of water on it, $1\frac{1}{2}$ miles N. 83° W. from the Barges light. It breaks in rough weather. Basse Verme-nou.

For Ré island lights, see page 242. Ré island lights.

The Pertuis Breton is the passage between the northern side of Ré island and the coast. It is 16 miles long, and from 5 to 7 miles wide, with banks and shoals extending a long distance off both shores. Pertuis Breton.

Approaching the Pertuis Breton, soundings are of great assistance in case of foggy weather. General direc-tions.

Soundings on
the parallel of the
Baleines light.

On the parallel of the Baleines light, 178 fathoms will be found at a distance of 116 miles, and 82 fathoms at 97 miles, the bottom being sand and broken shells. The muddy stream of the Gironde is met with a depth of 64 fathoms, and the lead shows mud bottom until in 50 fathoms water. A depth of 55 fathoms is 41 miles from the light.

In clear weather.

In clear weather, when sand is brought up again after passing the zone of mud, the light-ship of Roche Bonne will be visible to the southward and eastward, and should be passed to the southward 3 miles, steering then E. by N. for the entrance to the pertuis.

In thick weather.

In case of a fog, should rocky bottom be found 1 or 2 miles from the inner edge of the mud, it will indicate that the ship is nearly, or exactly, on the parallel of Roche Bonne plateau, and heading toward it, and the fog-signal should be listened for. If the breeze be from the westward, and nothing be heard, the ship should be brought by the wind, on the star-board or port tack, according to whichever side of the plateau it is desired to pass.

Should the vessel pass to the southward of the light-ship, it would perhaps be best to make Chassiron, and enter the Pertuis Breton by Pallice.

In case of passing to the northward, there will be no danger in running to the eastward until in 11 fathoms water. Rocky bottom at 9 fathoms would indicate that the ship is on the plateau off the western end of Ré island, and nothing should be made until sand is brought up, possibly with a little mud. The vessel would then be off the bar of the Pertuis Breton, on which there is a depth of 9 fathoms at low water. South of the bar the bottom is rock, and the depth less.

Cautions.

The nature of the bottom not having been studied as carefully here as off the Pertuis d'Antioche, a vessel caught in a fog and seeking shelter from approaching bad weather, had better work into the latter, according to directions given under that head, and find a lee in the Basques or Aix island roads.

Soundings on
the parallel of
Les Sables
d'Olonne.

Should a vessel be farther north, on the parallel of Les Sables d'Olonne, the inner edge of the stream of the Gironde will be found 41 miles from that point, with a depth of 55 fathoms. The bottom then changes to gray sand, and

afterward to gravel and broken shells. At night, in clear weather, when in 47 fathoms water, the light of P'le d'Yeu will be seen in the NE. and that of the Barges d'Olonne will be seen when in 21 fathoms, sand and gravel. Roche Bonne light is not visible from the parallel of $46^{\circ} 30'$.

For currents off the pertuis, see page 247.

In clear weather the entrance to the Pertuis Breton is not difficult, either by night or by day. Baleines light will be made first, and then that of the Baleineaux, which latter must not be approached nearer than 2 miles, on any account.

Currents in the
offing.
Entering the
Pertuis Breton.

Besides the lights on either shore of the pertuis, there are several other good landmarks.

Landmarks.

On Ré island, the church steeple of Ars, 3 miles to the southward and eastward of Baleines light, is equal in height to the tower of the latter, and its spire, which is black, is often seen from the offing before any other object. Farther to the eastward are the town and citadel of Saint-Martin, and its church steeple. Still farther the village of La Flotte lies on the shore, and is recognizable by its blunt-topped steeple. The old abbey of Saint-Laurent, with black gable, will then be made 1 mile east of La Flotte, and south of the former is the tall spire of Sainte-Marie.

On Ré island.

On the northern shore of the pertuis, good landmarks are more scarce, the coast being composed of sand-dunes from point Grouin du Cou to the mouth of the Lay river, and the village of l'Aiguillon, near the latter, being barely distinguishable from the offing. To the southward and eastward of the latter are La Dive, a calcareous mound in the middle of the prairies of Aiguillon, and the light-beacon of Aiguillon. Bearings may be taken farther on of the spire of Charon, and the peculiar steeple of Marsilly, and the *lanterne* of La Rochelle is visible as well from the Pertuis Breton as from that of Antioche.

On the main-
land.

Arriving off the Pertuis Breton in weather clear enough to see the land by day and the lights at night, bring Grouin du Cou light to bear N. 82° E., and steer for it. When the Baleines and Haut Banc du Nord lights are in line, change the course to S. 70° E., which will lead to the Pointe du Plomb at the head of the pertuis.

Directions.

In smooth weather the Baleineaux or Haut Banc du Nord light may be more nearly approached by heading for Grouin

With smooth
sea.

du Cou on a bearing as far north as N. 65° E. On this course $5\frac{1}{2}$ fathoms will be the least depth found.

Caution.

A check as to the proper distance to pass from the Baleines point is to keep the top of Baleines light-tower over the top of that of Baleineaux. Should the latter entirely hide the former, the depth would only be $2\frac{1}{4}$ to $4\frac{1}{4}$ fathoms, and the sea would probably be breaking, although smooth outside.

In rough weather.

If there be much sea on, vessels entering the pertuis from the northward should come south so as to bring Grouin du Cou light on the above bearing, (S. 70° E.,) because on the long, narrow bank off that point the sea often breaks, although there are $5\frac{1}{2}$ fathoms on it at low water.

As a general rule the Pointe des Portes, a cape on the northern end of the island near Lizay point, should never be brought to bear to the southward of S. 20° E., nor Per-ray point, on the main-land, to the westward of N. 44° W. before heading in, even in the smoothest weather.

Ordinarily vessels head in when Saint-Martin steeple opens from Loix point, S. 48° E.

At night.

At night approach the entrance on the bearing given above, changing course to S. 70° E., when Baleines and Baleineaux lights are in line, being careful to have the former visible over the latter.

The course S. 70° E. follows the *fosse de Chevarache* throughout its length, and leads directly to the outer anchorage of Saint-Martin, passing 1 mile from Lizay point, and $1\frac{1}{2}$ miles from Islattes (or Plattes) tower.

Tides in the Pertuis Breton.

Ordinary springs rise 15 to 17 feet in the Pertuis Breton, neaps 12 feet. The time of high water, full and change, varies, although the same at the Sables d'Olonne as at La Rochelle, $3^h 31^m$.

Tidal currents.

The currents of both flood and ebb tides are stronger near the main-land than on the Ré island side of the pertuis, the half-flood running 2, and the half-ebb $2\frac{1}{4}$ knots near the former. Vessels beating in against the ebb-tide should therefore keep near the southern border of the *fosse*. Vessels beating out, even with a fair tide, would also have the advantage of a smoother sea under Ré island.

Fosse de Chevarache.

The *fosse de Chevarache* borders the northern shore of Ré island for a length of 10 miles, with depths as great as 28

fathoms off Lizay point. The southern border is rocky and shoals almost perpendicularly. To the westward sand predominates at 12 to $16\frac{1}{2}$ fathoms. The outer bar does not break the sea sufficiently to admit of anchoring in bad westerly weather; even with a SW. wind a long swell heaves in round the Pointe des Baleines.

The tidal currents run strong, and follow the general direction of the deeps, turning three-fourth of an hour after high or low water.

Tidal currents.

Ships sometimes find shelter from S. or SW. winds off Baleines point in $16\frac{1}{2}$ feet and over, with Haut Banc du Nord light bearing W. by N., and Baleines light S. 28° W. The bottom here is principally sand and gravel, but there are occasional flat rocks; so the holding-ground can scarcely be considered good. Another bad feature is, that at high water the swell heaves in over the rocks extending NW. from the point. Eight hundred and seventy-five yards east of the light-tower on the point is a little jetty, under the lee of which boats can land. A *white* pyramid, 200 yards west of the beginning of the jetty, in line with Ars steeple, gives the NE. limit of the rocks that uncover on the Baleines bank.

Conche des Baleines.

The rocky bank of Les Portes, with $6\frac{1}{2}$ feet on it at low water, extends $1\frac{1}{6}$ miles N. and NE. from the redoubt of Les Portes. Saint-Martin steeple, bearing S. 48° E. open of Loix point, leads clear to the northeastward of it.

Banc des Portes.

The Fief rock, over which is a depth of $3\frac{1}{2}$ fathoms, rises abruptly on the southern border of the Fosse de Chevarache. The bearings of its top are the steeple of Les Portes S. 81° W., between Baleines light and semaphore, and the factory chimney of Loix S. 2° E. open to the right of Loix church-steeple. Between the rock and Ré island is a channel of great depth.

Roche du Fief.

Off the entrance to the inlet called the Fief d'Ars is the Bûcheron buoy, 300 yards to the eastward of which is anchorage in $16\frac{1}{2}$ feet water, sand and mud bottom, sheltered from all winds except the NW. Large vessels never enter the bay, although they could do so at high water, the depth at low-water springs being only $6\frac{1}{2}$ to 8 feet.

Fief d'Ars, or Fiers d'Ars.

The lower masts of a sunken brig will be seen on the end of the Bûcheron bank.

Outer anchorage of Saint-Martin.

Vessels seeking shelter from a west or southwest gale will find it off Saint-Martin, in the outer anchorage, where the holding-ground is excellent, the bottom being mud mixed with sand and broken shells, at 10 to 11 fathoms. There is danger of the wind shifting to the NW., which would raise a bad chop-sea during the ebb-tide; but in that case a berth could be taken inside Le Rocha bank, in the roadstead, or if the draught of water permit, Pallice anchorage could be made.

Bearings.

The marks of this outer anchorage are Ars steeple S. 72° 30' W., in line with the NW. mill of Loix; Islattes tower (sometimes called Plattes) S. 67° 30' W. on with the mills of Le Passage, (a small settlement south of Loix, on the west shore of the Mer du Fief;) Saint-Martin steeple S. 18° W. over the harbor palisade; the mills of Préau with the beacon Couronneau S. 4° E., to the right of the Grenetière mills; the steeple of La Flotte a little open to the right of that of Sainte-Marie, the latter bearing S. 15° E.; and the *lanterne* of La Rochelle over the mound to the southward of the guard-house of Le Plomb point.

At night.

At night, Baleines light should bear W. $\frac{1}{4}$ S., Aiguillon light N. 76° E., and Saint-Martin light S. 16° 30' W.

Caution.

In case the compasses should not be perfectly reliable, the ship should not come any to the southward of the position indicated by the first two angles, for fear of getting too close to Le Rocha, a shelf extending E. by N. from Loix point $3\frac{4}{5}$ miles.

Saint-Martin roads.

Vessels of not more than 16 feet draught, wanting to come to temporarily off Saint-Martin, will find shelter from the sea in the roads, to the southeastward of Le Rocha. The bottom is mud at $3\frac{1}{2}$ fathoms. Vessels should moor with sufficient scope on each chain to swing clear of their anchors at low water. The SE. edge of Le Rocha is steep-to, and in case of the wind coming out from the southward it would be advisable to take every precaution not to touch it, even to carrying out another anchor.

Wreck.

On the plateau of Le Rocha, 950 yards SW. from the Islattes tower, is the sunken wreck of a brig, marked by a small buoy 330 yards NNE. of it.

Directions.

To reach the roads from the outer anchorage, steer S. 70° E. for Plomb point, after getting under way from the latter,

until Saint-Martin light-tower and steeple come in line, when port the helm and steer S. 28° W. for 1 mile, and anchor.

The tidal currents in Saint-Martin roadstead are influenced on one hand by the general direction of the pertuis, and on the other by the Fosse de Loix, the various branches and canals of which draw a large mass of water. The consequence is that inside Le Rocha there is a marked eddy. The early flood of Saint-Martin and La Flotte sets to the westward along the shore to Loix inlet, while in the offing it sets to the southward, southeastward, and even northeastward. Near the Pen Breton the current of the ebb first sets SW. in front of La Flotte, and soon after to NW. But at half-ebb this current goes only a little beyond Couronneau, when that of the deeps of Chevarache joins it and they bear together on Le Rocha.

Tidal currents.

The channel leading into the harbor of Saint-Martin has only 3 feet in it at low water, the depth alongside the quay being $6\frac{1}{2}$ feet. But at high water large vessels can enter, the principal difficulty arising from their length rather than their draught, because of a bend in the channel.

Harbor of Saint-Martin.

There are two tide-gauges near the entrance. The zero of the red one corresponds to the sill of the wet-dock, and the old one gives the depth in mid-channel. Besides these two, there is on the end of the jetty a white vertical stripe, the lower end of which corresponds to the $13\frac{1}{10}$ feet depth on the red stake, or $18\frac{1}{10}$ above the zero of the French charts.

Tide-gauges.

The sill of the wet-dock has 5 feet on it at low water, so that at high-water springs it will take vessels of heavy tonnage.

Wet-dock.

To enter the port, bring the flag-staff in line with the west end of the hospital, or the hospital between it and the light-tower.

Entering the harbor.

As soon as the rocks of Couronneau, E. of the entrance, are covered by the rising tide, the current sets to the westward, and a vessel should keep on the port side of the channel, near the jetties.

Caution.

Préau anchorage is S. of Préau bank, on which is a depth of only $1\frac{1}{2}$ fathoms at low water, and is, strictly speaking, a part of Saint-Martin roadstead. It is about 1,500 yards long E. and W., with depths of $5\frac{1}{2}$ fathoms and over, but is only about 225 yards wide; it is often necessary to carry

Préau anchorage.

out another anchor to the southward, in case of the wind coming from that quarter, to avoid touching Préau bank, which is steep-to, and on which enough sea would be raised to knock any ship to pieces that were to strike. The Préau anchorage is commonly called by fishermen and others the Trou des Sept Brasses, (7-fathom hole.)

Directions.

To enter Préau anchorage, follow directions for making Saint-Martin roadstead, and starboard the helm in time to keep Islattes tower just open to the northward of Baleines light astern, which will give a course of S. $84^{\circ} 30'$ E. Anchor on this bearing, when Couronneau beacon passes in line with Saint-Martin steeple, S. 58° W. For other marks, the Préau mills will be about in line with each other; Sainte-Marie steeple will be bearing S. 1° E. between the wind-mills E. of La Flotte and Barres point; and the water-mill of Rivedoux will be over the point of the fort de la Prée. In the westward Ars steeple will be open about 1° to the southward of the chimney of Le Passage.

At night.

In case of wishing to make this anchorage at night, a vessel should keep on the course S. 70° E. until La Flotte light bears S. 5° W., when put the helm hard aport and steer for it on that bearing, coming-to when the increased depth shows that the anchorage is reached. It might be well to use a sextant instead of the compass, as a vessel would bring up on Préau bank, were she, from any compass error, to go too far to the eastward before heading for La Flotte light. A good angle would be the latter and Grouin du Cou light, 135° apart, as it would be diminishing rapidly, and the proper time would be quite accurately fixed for heading for La Flotte. Saint-Martin and Grouin du Cou lights, 83° apart, may also be used.

Anchorage of La Flotte.

The anchorage of La Flotte is SE. from Saint-Martin roads. It having a depth of only $11\frac{1}{2}$ feet at low water, few vessels are seen there but coasters.

Directions.

To reach it head for Saint-Laurent abbey, after doubling Le Rocha, and anchor on the following bearings: Saint-Laurent and Sablanceaux points in one; the mill on the shore, E. of La Flotte, in line with the Grenetière mill; and the factory-chimney of Loix over the extremity of the Saint-Martin fortifications. The bottom is mud and shells.

At night.

At night run for La Flotte light immediately on entering

its range of visibility (bearing S. $\frac{3}{4}$ E.) and anchor when Saint-Martin light bears west.

Off Saint-Laurent point, on which is the ruined abbey so often used for a landmark, a ledge of rocks extends out 165 yards. Point Saint-Laurent.

A bank called the Peu Breton skirts the coast of Ré island from Sablanceaux point to La Flotte, and projecting out reaches the shoals off Aiguillon point. The depth over it at low water is only $9\frac{1}{2}$ feet, but at high-water springs it is sometimes as much as $29\frac{1}{2}$ feet. Vessels have to cross it to reach Pallice anchorage or the Pertuis d'Antioche. Peu Breton.

The Peu Breton divides the current leaving Aiguillon bay, one part going south through Pallice anchorage, and the other joining the general current in the Pertuis Breton.

To reach Pallice anchorage from the northward, steer S. 70° E. for Plomb point until about 2 miles from it, which will be when Sainte-Marie steeple has opened a little to the eastward of the fort of La Prée. Then port the helm and steer S. 4° E. for Lavardin tower, which on that bearing will be seen at one-third distance between Sablanceaux and Saint-Marc points. This course leads to the anchorage, where depths of not less than 16 feet will be found at low water after the steeple of Laleu appears to the northward of the Lanterne of La Rochelle. For $5\frac{1}{4}$ fathoms and over keep on to the southward of abreast Sablanceaux point. To reach Pallice anchorage.

Pallice anchorage, or, as it is sometimes called, the Cour-eau de l'Île de Ré, begins at the Peu Breton and extends to Lavardin tower. The largest vessels can safely remain there, the depth in some places being 7 fathoms. East, a half mile from Sablanceaux fort, is the deepest water and perfect shelter, but with the single objection of the tidal currents running $1\frac{1}{2}$ knots at springs. Pallice anchorage.

Very good anchorage in $4\frac{1}{2}$ fathoms is found half a mile NE. of Sablanceaux point; the bearings are Chauveau light just outside and touching the redoubt of Sablanceaux; Sainte-Marie steeple over that of Rivedoux; and the steeple of Laleu open its width to the southward of the mill of La Repentie.

At low-water springs the tidal current runs 1 knot to the southward and westward between Chauveau light and Lavardin tower, not turning for one hour. The flood then runs to Tidal currents.

the eastward, and a half-hour later makes to the northward toward Aiguillon bay at a rate of $1\frac{3}{4}$ knots. At high water the flood-tide still has a strength of a half-knot in the same direction. The ebb commences to make shortly after, and attains its greatest velocity one hour before low water.

Aiguillon Bay. Aiguillon bay dries at low water, but the depth of the mud is such that vessels, even of large draught, entering at high water, will be left upright in it by the ebb tide. It is an excellent place for a vessel to make in the event of having lost masts or anchors. In case of heavy winds the mud stirred up makes the water too sluggish to admit of any sea being raised.

The bay was formerly used a good deal by coasters as well as by deep-water ships, but the railroads, and the decrease in the depth of the anchorage at the entrance, have diminished the number of either. It is now only frequented by vessels bound up the Luçon or Marans rivers.

Directions.

In the day-time, a vessel bound for either of these rivers, or intending to ground in the bay, after skirting the Jaux bank should steer to pass $1\frac{1}{2}$ miles south of Aiguillon point. Before reaching the anchorage, abreast the light, which has $11\frac{1}{2}$ to 13 feet of water, a mud bar will be crossed with only $8\frac{3}{4}$ feet. At high water, however, any vessel can pass it. The best anchorage is between Aiguillon light and point Saint-Clément d'Enandre, on the following cross-bearings: La Dive between Aiguillon light and beacon, Repentie point open 2° W. of Plomb point, and Enandre steeple over Saint-Clément point. The depth on these bearings is 13 feet, soft mud bottom.

Coasters generally pass to the eastward of the beacon. Large ships, dismantled, should try to work to under the lee of the sand-spit marked by the beacon. Should that be impossible there would still be a good chance for them in the eastern part of the bay, as many vessels have been saved in the artificial basins of the eastern shore.*

Port of Les Sables d'Olonne.

The port of Les Sables d'Olonne is small, and dries at low water. It is entered through a passage between two moles,

* The basins are made by planting rows of fascines vertically in the mud. In them are cultivated various shell-fish, which occupation furnishes employment to the inhabitants of Charon, Enandre, and Marsilly.

which extend to the southward, one from Saint-Nicolas point, and the other, which is the larger, though not the more prominent, from the west end of the town.

Saint-Nicolas point is distinguishable by a fort and a small church. Saint-Nicolas point.

The Sables d'Olonne roadstead, with the channel leading therefrom to the entrance of the port, lies in front of a large sand-beach, and has a depth of $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, bottom principally of sand, with occasional mud and rock. Although the holding-ground is good, it is not a safe place to ride out a gale of wind. In the event of bad weather coming on, however, there is a good chance of being able either to put to sea or make l'Ile d'Yeu, or the pertuis, for shelter. Roadstead.

The marks of the roadstead are the jetty and La Chaume lights in line in the northward, and the Potence and Stockade lights in line in the eastward; La Chaume will be over the spur of Saint-Nicolas, and the alley to the left of Les Sables steeple open from it and over the arch in the quay.

The roadstead is limited in the westward by three rocky shoals, called Le Noura, Le Nouc'h, and the Barre Marine, which extend to the southward and eastward from Saint-Nicolas point, and on which at low water are depths of $7\frac{1}{2}$, 1, and $25\frac{1}{2}$ feet, respectively. Shoals.

In bad weather there is a continuous line of breakers between Saint-Nicolas point and Le Nouc'h, and in a heavy gale they extend to the eastward of the latter to the shore. The Barre Marine seldom breaks.

The approach to this portion of the coast is indicated at night by the Barges light, and by that of La Chaume, the latter being the higher of the two, although not visible as far as the former. Approaching from seaward.

Coming from the southwestward, still another light will be visible at a slight elevation above the sea; this is the jetty light, and to the right of it will be noticed a luminous appearance caused by the lights of the town.

The jetty light, when bearing to the eastward of N. 55° E., is hidden by the fort of Saint-Nicolas.

A vessel coming from the westward, when $2\frac{1}{2}$ miles from the Barges light, should head three points to the southward to clear all the dangers of the Barges.

Beating up
near the Barges
d'Olonne.

A vessel beating about in the vicinity of the Barges d'Olonne, should not come nearer than $1\frac{1}{2}$ miles to the westward of the light, if there be much sea on, because the sea becomes very high on the $6\frac{1}{2}$ -fathom patches, and breaks in bad weather on the Basse Vermenou, which has $4\frac{1}{4}$ fathoms on it.

In very bad weather the breakers of Vermenou join those of the Grande Barge, and a vessel should not attempt to pass between, although the depth of water be ample.

In smooth weather the Barges light may be approached to one-third mile from the westward, taking for a limit the Petite Roche des Barges, (which almost always breaks,) S. 40° E., open two points outside of Perray point.

The northern limit of the bank on which stands the light-tower is given by Les Sables steeple open a little to the northward of that of La Chaume. The two in line lead through in $3\frac{3}{4}$ fathoms of water, where the sea breaks in rough weather.

On the southern side, if there be much swell in the offing, neither the Grande nor the Petite Barge should be approached very close, as the sea is tremendous on those plateaux. A vessel will keep clear in the southward, either by steering to the southward of the bell-buoy, 275 yards SSW. of the Petite Barge, or by going nothing to the northward of the alignment of a wind-mill without sails, (the highest of all those on the right of the town of Les Sables,) or the Potence light, and the low point of Saint-Nicolas, or by keeping the Saint-Jean mill always to the right of La Grange farm-house.

The little rock of the Barges dries $9\frac{3}{4}$ feet at low water.

Pass between
the Grande and
Petite Barges.

The pass between the Grande and Petite Barges is often used, in day-time, by coasters. The least depth is $5\frac{1}{2}$ fathoms, so there is nothing to fear as far as the water is concerned. In rough weather it should be avoided.

Directions.

In good weather, to run through the middle of this pass, steer N. 89° E. for the fort of Saint-Nicolas in line with the southernmost of three mills on the southern end of the beach of Les Sables. Keep this course until abreast of the Petite Barge, when the ship's head should be laid S. 77° E., having La Péruse rock off Tanchette point under the mill of

Saint-Jean, which latter will be between the farm-house of La Grange and the Tanchette guard-house. This course leads at a safe distance from the rocks of the coast, and must only be left to enter the pass inshore of Le Noura.

The alignment of the mill of Saint-Jean may be made, by a vessel coming from the northward, after rounding at a distance of a half-mile the Barges light. The range also leads south of Vermenou.

From the Ecarquillés rocks to Le Noura, the latter alignment is the limit of boards a vessel should make to the northward, to avoid the rocks off the coast.

To enter the passage between the Grande and Petite Barges, a more northerly alignment may be substituted for that given of the fort of Saint-Nicolas. A good course would be N. 80° E. for the steeple of Les Sables, midway between La Chaume light and the Pen Judith. The latter is an abrupt eminence on the coast, north of the semaphore, and in the given alignment appears to the left of La Chaume light. When abreast of the Petite Barge, steer S. 77° E. as directed above.

Coasters coming from the northward frequently use the Baudras channel, inshore of the Grande Barge.

Pass inshore of
the Grande
Barge.

If coming from the northward with good weather, steer for the Barges light, until 450 or 500 yards from it. If coming from the NW. steer first S. 77° E., for the steeple of Les Sables a little open to the northward of La Chaume steeple, or else S. 72° E., for La Chaume light a little open to the southward of La Chaume mill, until the Barges light bears S., when steer for it. When 500 yards from the latter, starboard the helm, and steer to round the light at a distance of 500 to 550 yards, until it bears W. The course then is SSE. for a mile until Saint-Jean mill is between the guard-house and farm-house of La Grange; when the latter is open its own width to the southward of the guard-house, the southern point of the Ecarquillés rocks is passed.

Directions.

In bad weather the Baudras channel is impracticable, as the Vermenou breakers join those of the coast.

The Grand channel, leading up to the harbor of Les Sables from the southward and eastward, is the only one that can be used in bad weather.

Grand channel
to the harbor.

Directions. Bring La Chaume light to bear N. 40° W., a little to the left of the light on the jetty forming the east side of the entrance, and steer for it.

Caution. Vessels coming from the northward or westward must come on that alignment far enough to the southward to clear the Barre Marine. A distance of $1\frac{1}{2}$ miles from Saint-Nicolas point would be ample, because a little less than three-fourths mile SE. of that is the Basse de la Prunière, which is seldom known to break, but on which is a depth of only $4\frac{1}{2}$ fathoms.

Depths. On the course N. 40° W., leading along the shore, nothing less than $5\frac{1}{2}$ fathoms will be found until the semaphore near the fort of l'Aiguille passes over the extremity of Saint-Nicolas outer jetty. The depths then decrease gradually, and near the first red buoy, called La Mouette, there are only $3\frac{1}{3}$ fathoms, bottom of sand and rock partially decomposed. Vessels generally anchor there to wait for the tide to serve.

At night. At night vessels coming from the S. or W. bring the light on the jetty a little to the right of the higher light of La Chaume, and anchor in the roads on that range.

S. W. pass. With W. or WNW. winds, in moderately good weather, some time and distance can be saved by passing to windward of the Barre Marine, between it and Le Nouc'h in the southwest channel.

Directions. To enter that channel bring the city mill (the lowest of ten mills east of Les Sables) in line with the fourth from the north, or the mill without sails, on the height, over a mill half-way up the slope, the fourth from the south. These two ranges are parallel and lead in N. 34° E. When La Chaume light passes to the eastward of the wall of Saint-Nicolas, starboard the helm and proceed as directed above.

This SW. pass is called the Grand channel from the westward.

Pass between
Le Nouc'h and
Le Noura.

The pass between Le Nouc'h and Le Noura is not practicable in bad weather.

Directions. Having a smooth sea, while in the offing, bring the city mill to bear N. 43° E., open half its own width to the right of the mill without sails or the Potence light, the two latter being adjacent. Starboard the helm when the spire of La Chaume steeple passes to the right of La Chaume light, and

steer for the red buoy, which will be under Les Sables steeple. If intending to enter the harbor, steer for the light-tower on the end of the eastern jetty.

The course N. 43° E. leads over the tail of Le Noura, with 4½ fathoms; but this depth should be sufficient, being greater than that of the inner roadstead, and *a fortiori* greater than that on the harbor bar.

At night the two *red* lights of La Potence and the Stockade lead in on the same bearing within one-half degree. At night.

The pass inshore of Le Noura has only 10½ feet at low water, but that being more than will be found at the entrance, the pass is practicable in smooth weather for any vessel that can enter the harbor. Pass between Le Noura and Saint-Nicolas point.

The range in which to enter this pass is that of the three southernmost mills of Les Sables. These three are not perfectly in line; the middle one, which has no roof, should be brought under the one on the height, and the lower one will be a little to the left of their alignment. Steer in N. 73° E. on this range until La Chaume light passes to the eastward of Saint-Nicolas fort. Then starboard the helm gently, rounding the Potée de Beurre and the Petite Pierre du Port, and when La Chaume light is well open to the eastward of Saint-Nicolas point, head for the eastern jetty. Directions.

The outer anchorage is indicated by the buoy of La Mouette, 470 yards S. 47° E. from the end of the eastern jetty, and is very good as long as the wind remains in the N. or NW.; but should there be a shift to west or southwest, a bad sea would be raised very quickly. The holding-ground is good, and vessels have been known to ride out very heavy gales of wind at anchor there. On the other hand, vessels *have* been known to part their cables, and be lost, with all on board, on the beach. Outer anchorage.

Before entering the harbor, the height of the tide must be obtained. Entering the harbor.

It is high water, full and change, in the harbor of Les Sables d'Olonne, at 3^h 31^m. The mean spring rise is 15 feet; neaps 11½ feet; mean neap range 8 feet. The height at any time can be obtained by deducting 2⅔ feet from that at Aix island for the same hour, found in the *Annuaire des Marées*. In case of a vessel waiting in the outer anchorage, the height can be found by means of signals made from the Tides.

flag-staff near the end of the jetty, or by the gauge painted on the salient angle of the jetty, or by the uncovered parts of the rocks and outer works.

Directions. Steer for the light-tower on the eastern mole until the alignment is made of two *red* light-beacons on the western quay, to the right of La Chaume light. After passing the latter keep midway between the quays.

At night. At night the directions are the same, and are easy to follow, using the two *red* lamps on the left quay.

Vessels ground in the black mud and sand in the harbor, well protected from the sea.

Wet-dock. The wet-dock, which was opened to vessels in May, 1874, is entered by a lock 54 feet wide. The length of quay surrounding the dock is 470 yards. Draughts of $19\frac{2}{3}$ feet can enter at highest springs, $16\frac{1}{3}$ at ordinary springs, and 13 at neaps.

There is no special charge for entering the dock.

Town of Les Sables d'Olonne. The town of Les Sables d'Olonne is built partly on level ground, scarcely raised above the level of the sea; the remainder is slightly elevated, and in the form of an amphitheatre. Several of the streets are long and handsome. Two churches, a nunnery, alms-houses, schools, hospitals, and a prison are among the establishments of the place.

Population. The population is over 6,200.

Industries. The Sables d'Olonne has long been the first fishing-port on the coast of France, and the establishment of a railroad connecting with other lines in the interior will develop its commerce.

CHAPTER IX.

LES BARGES D'OLONNE TO QUIBERON PENINSULA.

Variation in 1876.—L'Ile d'Yeu, $19^{\circ} 18'$ W.; Belle-Ile, $19^{\circ} 30'$ W.; mouth of the Loire, $19^{\circ} 10'$ W.

Corbeau point, the eastern extremity of the Ile d'Yeu, is $12\frac{3}{4}$ miles W. of the Pointe de Grosse Terre, near Saint-Gilles-sur-Vie. The island is $5\frac{1}{2}$ miles long WNW. and ESE., 2 miles broad, and quite regular in form. L'Ile d'Yeu.

There is but scanty vegetation on the island, it being in fact simply a huge mass of granite, moderately high and steep in the W. and SW. parts, but low and flat in the eastern.

Vessels bound for the pertuis with NW. winds, or those coming from the English channel bound for Bordeaux, should verify their position by sighting this island, particularly if they have not made Belle-Ile.

Independently of the advantages it affords vessels for verifying position, &c., the island has several anchorages, in two of which, those of La Sablaire and La Conche, large vessels can find shelter from all winds from NW. round by W. to SE.

The currents in the vicinity of l'Ile d'Yeu flow toward every point of the compass, turning with the hands of a watch. At half-flood the direction is NE., changing at high water to SE. round one end, and SW. off the other end of the island. Tidal-currents.

The current of the flood seems to come from SW., striking first near Vieux-Château bay and separating into two branches, which, rounding Corbeau point and the Chien-Perrins rocks, respectively, join again off Gautier point and flow toward Fromantine. Near the Chien-Perrins it attains a velocity of 3 knots, running to the east-northeastward, and setting vessels on these rocks. Many shipwrecks have been brought about in that way. Flood-tide.

Ebb-tide.

During the ebb-tide the current flows S. and SW. round the E. end of the island, and SW. and W. off the W. end. It attains its maximum speed of 3 to 4 knots after SE. or E. winds. With a W. or NW. swell at the same time, the sea becomes very short and is covered with white-caps.

Tides.

It is high water, full and change, at Ile d'Yeu at 3^h 6^m. Mean springs rise 14 $\frac{1}{4}$ feet; neaps 10 feet.

Landmarks.

Apart from the light-towers, the principal landmarks are a square fort in the interior 1 $\frac{3}{4}$ miles ESE. $\frac{3}{4}$ E. from Pointe de la Butte, the western extreme of the island, and the church-steeple of Saint-Sauveur, 1 $\frac{1}{4}$ miles N. from Pointe de La Tranche the southernmost headland. On the SW. shore is the Château in ruins, and bearings are frequently taken of different mills.

Petite Foule
light: Lat. 46°
43' 04" N.; long.
2° 23' 02" W.

On the mound of Petite Foule, 1,860 yards to the southward of the northern point of l'Ile d'Yeu, and 1,815 yards SE. $\frac{3}{4}$ E. from La Butte point, is a circular white tower, 108 feet high, exhibiting, at an elevation of 112 feet above sea-level, a *fixed white*, dioptric, first-order light, visible 18 miles. It illuminates the whole horizon, being visible over everything on the island.

Signal-station.

On La Butte point is a semaphore, with white building. Geographical number B. G. Q. C.

Port-Breton
lights.

There are two harbor-lights at Port-Breton, one at the outer end of the jetty called the grand quay; on the north side of the entrance, in latitude 46° 43' 37" north, longitude 2° 21' 02" west, is a *fixed white*, dioptric, fourth order light, visible 8 miles, elevated 26 feet above sea-level, exhibited from a circular red tower, 17 feet high.

At the head of the harbor, 284 yards SSW. from the former, is a square white tower, 39 feet high, exhibiting a *similar* light, 66 feet above sea-level, and visible 9 miles.

Also, a *fixed red* light is shown from a lamp-post on the wall of the left bank of the entrance, 95 yards from the extremity, elevated 26 feet above sea-level, and visible 5 miles.

Life-boat.

A life-boat is stationed at Port-Breton.

Corbeau Point
light: Lat. 46°
41' 26" N.; long.
2° 17' 09" W.

On Corbeau point, exhibited from a square white stone tower, 38 feet high, with dwelling attached, is a *fixed red* light, elevated 64 feet above the sea. This light is dioptric, of the fourth order, visible 7 miles.



Ile d'Yeu from the NW.



SW. Coast of Ile d'Yeu.



Ile d'Yeu from the SE.



Pilier Islet from the SW.

As is the case all along this portion of the French coast, ^{Approaching} reliance can be placed, to a considerable extent, on the ^{Ile d'Yeu.} soundings off the island, both as regards the depth of water and the nature of the bottom.

On the parallel of Petite Foule light, gray sand will be ^{Soundings on} found at 110 fathoms, 106 miles to the westward, and at 82 ^{the parallel of} fathoms, 85 miles off. Muddy sand will not be brought up until 65 miles from the light, in 73 fathoms water; at about 50 miles, at a depth of 65 fathoms, is soft mud; and finally, 31 miles off, are 55 fathoms. The soundings continue to diminish, and the bottom changes from mud to sand mixed with gravel and shells. Inside the zone of mud, oyster-beds are also found. There are 11 fathoms just clear of the rocks off La Butte point.

During the day, if the weather be clear, the island will ^{In the day-time.} be recognized by Petite Foule light-tower, which will seem to stand in the water, being sighted before any part of the land. Near it will be seen the spire of Saint-Sauveur, almost equaling it in height. The central fort will also be noticed when the land is made.

Coming from the northwestward, and passing the island ^{At night.} in clear weather at night, Petite Foule light will be made as that of Belle-Ile is sunk, and will still be visible from aloft when Roche Bonne is sighted.

There is no great necessity of sounding much when ap- ^{Approaching} proaching the island from the NW., as Belle-Ile will prob- ^{from northwest.} ably have been made. The depths decrease, but the changes are abrupt, and rocky bottom predominates off the mouth of the river Loire.

Off La Butte point are a number of rocks, called Les ^{Les Chiens-} Chiens-Perrins, which were formerly greatly feared by nav- ^{Perrins.} igators, because of the current of the flood-tide setting on them so strong. They are avoided in the SW. by not allowing the Evêque rock, of the Troupaille group, to open from La Panrée point. The highest is about 19 feet above low-water springs.

The Grand Champ rock, the top of which is 18 feet above ^{Le Grand} low water, lies one-half mile off the NW. shore of the ^{Champ.} island, on the alignment of the central fort and Saint-Sauveur steeple beyond. The latter, open to the northward of the former, shows clear to the northward of the rock.

Basse Cantin. The Basse Cantin is a shoal, which, protruding only 1 foot above low water, is very much feared by the smaller vessels that hug the shore. It is the extremity of a ledge of rocks extending to the northward of La Brame, the northernmost point of the island; its bearings are Petite Foule light-tower over the black top of the rocks, and the outer light of Port-Breton just shut in by the north angle of La Croix fort. The latter light, open of the fort, leads clear, and the pilots always use that range at night.

Basse Sauzey. The surveys give a least depth of 5 fathoms on Sauzey bank, but a fisherman has reported a much shoaler spot on it, and although the head that he mentioned could not be found afterward, it is best to steer clear of it while there is any doubt on the subject. It is $2\frac{3}{4}$ miles north of the island, and is cleared by the following ranges: in the east by Le-compte mill in line with Port-Breton steeple, S. $20^{\circ} 30'$ W., and in the west by Saint-Sauveur steeple over the extremity of the western jetty of Port-Breton, S. 26° E. These ranges lead 1 mile clear of it.

Port-Breton. Port-Breton is only accessible to small vessels, that come and ground there for shelter. The inner harbor dries $7\frac{1}{2}$ feet at low-water springs, but in other places are depths of $7\frac{3}{4}$ feet, and vessels of 300 tons have been there for shelter.

Tide-signals. Tide-signals are made at the end of the jetty.

Outer anchorage. In the outer anchorage is a depth of 10 feet at low water, and small vessels frequently drop anchor there, sheltered from the heavy SW. sea.

La Sablaire anchorage. With the wind from any point between SE. and west, the anchorage of La Sablaire is under the lee of the island, and has $19\frac{1}{2}$ feet at low water, over sand and shells. There is no sea there unless the wind come from the NW., and in that case vessels are always able to get under way under sail, and find a lee to the southward of the island, or in the pertuis.

Directions. To make La Sablaire anchorage from seaward, give Petite Foule light-tower a berth of at least 2 miles, while rounding the north end of the island, and steer S. 39° E. for Corbeau light shut in with point Gautier, or the latter and La Conche point in line. These ranges lead within one-half mile of the shore, and the anchor may be dropped when the northern end of the horseshoe of Port-Breton is in line with the houses south of La Croix fort and Le Calvaire,

Petite Foule light-tower open to the southward of Port-Breton steeple the width of the latter, S. 77° W., and Lecompte mill over the middle of Kernichalon village.

La Sablaire bank has $10\frac{3}{4}$ feet on it at low water over sand and shells, and is cleared to the eastward by keeping Saint-Sauveur steeple over the village of Les Sables, or Lecompte mill over Kernichalon; and to the westward by the Meunier and Lecompte mills in one, the former being the easternmost of two mills near Port-Breton, and the latter a little over one-half mile SE. by S. from the central fort.

Between La Sablaire bank and the island is a passage with depths of $18\frac{1}{2}$ to 25 feet. The point of Cantin open of the end of the western jetty of Port-Breton leads through the middle.

In this last range the point proper must be used, and not the rocks off it which uncover at low water. The latter, open of the end of the jetty, would put a vessel on Gautier point.

The Mayence rock is confounded sometimes with the northern part of La Sablaire bank, but it is very distinct from it, the bottom being rock, over which is a depth of $20\frac{1}{4}$ feet at low water. Saint-Sauveur steeple over the old battery of Gautier point leads clear to the eastward. Outside and to the eastward of it are other spots of rocky bottom also, but they are not elevated above the adjacent sand and gravel, and as vessels do not anchor so far out, they do not deserve special mention.

South-southeast of La Sablaire bank, a short distance to the northward and westward of Gautier point, is the Roche du Front, which protrudes $5\frac{1}{2}$ feet above low water. No steamer would come near enough to the point to be in danger of striking this rock, but vessels beating along the shore should tack when the little *red* tower off the entrance to Port-Breton is in line with the middle of La Croix fort beyond.

The anchorage of La Conche is sheltered from all winds between SE. through SW. to NW. Vessels indeed have ridden out gales from the latter point, the force of the sea being somewhat broken by Sablaire bank, and the holding-ground being better than that of Sablaire anchorage. With

the sand of the bottom here are mixed finely-broken shells and a little mud.

Bearings.

At a distance of one-half mile from the coast, sand and gravel are found at $20\frac{1}{2}$ feet at low water, with point Corbeau bearing S., and the end of the jetty of Port-Breton hidden by Gantier point. Farther S., on the same bearing of Corbeau point, is a better lee, but large vessels should not bring Petite Foule light-tower nearer to the old unroofed mill than to that of Maingron; *i. e.*, not to bear to the northward of W. by N.

Caution.

Large vessels coming from the southward to make this anchorage must give a good berth to Corbeau point and La Conche bank, not heading to the westward until Petite Foule light-tower is over the Maingron mill, S. 82° W.

Corbeau point.

Corbeau point, before the establishment of its light, was considered a dangerous place. An offing of one-half mile will clear all the shoals there.

Anse des Vieilles.

On the southern shore of the island, a little over 1 mile to the westward of Corbeau point, is a bay, called l'Anse des Vieilles, which is much frequented in winter by coasting and other vessels seeking a lee from NW. or NE. winds. The anchorage is with Saint-Sauveur steeple over the beach, NW. $\frac{1}{4}$ W. Large vessels may come there, as there is a depth of $16\frac{1}{2}$ feet at 225 yards from the shore, and a greater a little distance off the given range. The bottom is sand and gravel, and, except in the event of a shift to W. or SW., it is a good port of refuge.

L'Ours des Vieilles.

A rock, called l'Ours des Vieilles, is the SW. limit of the anchorage, and a vessel should never attempt to pass inshore of it, as it is connected with the cliffs by a chain of rocks. To clear this rock and Corbeau point it is simply necessary to keep Petite Foule light-tower visible over the land from deck.

La Tranche point.

To the southwestward of l'Anse des Vieilles is La Tranche point, which is cleared by keeping Petite Foule light-tower to the left of the battery of La Mule.

Port de la Mule.

In the port de la Mule is anchorage sheltered from northerly winds. To make it, steer first N. 33° E. for Saint-Sauveur steeple, or N. 20° W. for the central fort, and finally for a solitary tree over the point on the starboard hand. If the wind shifts to W. or S., vessels have to put to sea.

The Vieux Châtean bay is seldom used now. To anchor with $16\frac{1}{2}$ feet and over at low water, steer for Petite Foule light-tower to the right of a house and over a cleft in the rocks, N. by W. $\frac{3}{4}$ W. This range leads in to the northward of l'Ours and to the southward of the inner shoal.

Anse du Vieux
Château.

The Pont d'Yeu is a bank extending from the island to the northeastward to the main-land, and over which, for a width of 5 miles, is a depth of 19 feet. But as the sea can scarcely ever be perfectly smooth, it is not advisable for a vessel drawing more than 12 or 14 feet to beat over it at low water, or to cross it elsewhere than in the deeper channels.

Pont d'Yeu.

There are three cuts, with depths of $3\frac{3}{4}$ fathoms, uniting the deep water NW. of the Pont d'Yeu with that to the southeastward.

The northernmost of these channels is too far N. to admit of taking bearings on Ile d'Yeu. Besides, it is very tortuous.

To follow the second or middle channel, a large vessel coming from the northward should steer SE. to enter the deep to the northward of the Mayence rock; that is to say, should approach so as to pass Ile d'Yeu $2\frac{1}{2}$ miles to starboard.

Middle chan-
nel.

As a check on a ship's position, when Corbeau point bears S., Petite Foule light-tower should be visible over the jetty of Port-Breton; when on that cross-bearing steer S. by E. to just clear Corbeau point, until Petite Foule light-tower draws near the NW. angle of the central fort. Then, put the helm a-starboard 8 points, steering E. by N., with the light-tower astern just clear to the northward of the fort. After making 1 mile on this course, the ship's head may be laid SE. The least depth will have been 4 fathoms at low water.

The third or southern channel is a little to the southward of the middle one. To follow it steer as before, S. by E., to clear Corbeau point, but keep on that course until Petite Foule light-tower passes to the southward of the central fort, and over the middle of point Gautier. Then starboard the helm and keep this latter alignment astern, steering N. 88° E., until Corbeau point bears S. 27° W. The Pont

Southern chan-
nel.

d'Yeu will have been crossed with a least depth of $23\frac{1}{4}$ feet at low water.

Caution.

With a heavy sea, whether beating through or making a straight course, captains of vessels of such draught as do not need to take the deep channels, should not approach the Marguerites rocks. After a southerly blow, particularly if the wind have shifted to NW., the whole northern portion of the Pont d'Yeu is so covered with white water that there will be no doubt as to the expediency of passing near Ile d'Yeu.

Caution.

In the various courses made by large vessels, account must be taken of the set of the tidal currents. (*Vide* page 281.)

Coast from Les Barges d'Olonne to Saint-Gilles.

From the Pointe de l'Aiguille, off which lie the Barges d'Olonne, the coast runs $13\frac{3}{4}$ miles NNW. $\frac{1}{4}$ W., to Saint-Gilles-sur-Vie, and presents a series of sand downs of moderate height. At a distance of 2 miles off shore over $5\frac{1}{2}$ fathoms will invariably be found, while at $3\frac{1}{2}$ miles the depth is nowhere less than 11 fathoms at low water, with sand and gravel bottom.

Roches du Repos.

Between Bretignolles and Saint-Nicolas point, 1 mile to the southward of the former, are the Roches du Repos, under the lee of which small coasters frequently find shelter. These rocks, and all others in the vicinity, are avoided by keeping the Pilours rock inside Pointe de Grosse Terre.

Roches Biron.

The Biron rocks are $3\frac{1}{4}$ miles to the NNW. of the Repos rocks, and are avoided by keeping Saint-Hilaire steeple to the westward of that of Croix-de-Vie. The Biron rocks proper do not extend nearly out to that range, but 180 yards S. by W. from their extremity is a shoal, with only 14 feet which is cleared by it.

There is still another shoal $1\frac{1}{4}$ miles to the NNW. of the Biron rocks, which is avoided in the same way.

Roche Bonneau.

At a distance of five-sixths mile S. by E. from Pointe de la Garenne, the southern point of the entrance to the river forming Saint-Gilles harbor, is Bonneau rock. It is easily avoided by keeping Saint-Hilaire steeple open to the left of Garenne point. The steeple of Saint-Gilles, a little to the right of the highest of the sand-downs, leads in clear to the southward, in case of a vessel beating up along the land.

Caution.

When near the Bonneau rock, the drift of the vessel should

be watched, as the flood-tide sets on the rock from the offing.

Near the rock, a little to the southward of it, is a good place to beach a vessel in case of having sprung a leak, or being unable to claw off against a gale of wind. French vessels have been stranded there to escape an enemy of superior force.

To the northward of Bonneau rock, 1,175 yards S. by W. $\frac{1}{2}$ W. from Garenne point, in $8\frac{1}{2}$ feet water, is a rock but little elevated above the adjacent sands.

Saint-Gilles-sur-Vie is on the coast of La Vendée, and the port is recognizable from afar by the steeples of Croix-de-Vie and Saint-Gilles, near each other, and of characteristic form. From a distance of 5 or 6 miles, the Pilours rock is also seen off the Pointe de Grosse Terre.

On the end of a jetty extending to the southeastward from Croix-de Vie, on the north side of the entrance to the harbor, is a circular tower 27 feet high, from which is exhibited, at an elevation of 39 feet above the sea, a *fixed red*, dioptric, fourth-order light, visible 7 miles. It is called the Saint-Gilles light.

The Pilours rock, off Grosse Terre point, SW. by W. $\frac{1}{2}$ W., five-sixth of a mile from Garenne point, is 12 feet above high water and the rocks extend under water 225 yards to the southward and eastward of the uncovered part.

Under the lee of the Pilours rock, a quarter-mile ESE. from it, well sheltered from all winds between NW., and SE. through N., and with good holding-ground, is the outer anchorage of Saint-Gilles. The depth is 13 feet at low water, yellow sand bottom.

To reach the outer anchorage, double Pilours rock at some distance, and come-to with that rock bearing N. 62° W., open from Grosse Terre point, and Boisvinet rock N. 35° E., in line with the house on the beginning of the jetty on which stands the light.

With heavy northwesterly weather, the sea breaks, not only on the Pilours ledge, but also on the Roche Bonneau, so it will be necessary to come in close to leeward of the former breakers, so as to pass well to windward of the latter.

The southern limit of the Pilours rock is on the alignment of Boisvinet rock and Saint-Gilles light, and also that of Saint-Hilaire steeple over the eastern extremity of the sand beach of Porto. Boisvinet rock, moderately open to the northward of the light, leads in clear.

When the wind is from the northwest the pilots anchor a little to the eastward of the cross-bearings given for the outer anchorage; they bring the peculiar inclined trees of La Corbélière over the middle of the beach of Porto, and the little tower, in the river inside, slightly open from the end of the light-jetty. There is a depth there of 13 feet at low water.

With WNW. winds, shelter will have to be found in shoaler water farther north.

Caution.

The anchorage can only be considered a temporary one in case of winds from the westward or the southward, it being impossible to hold on there against any sea, and the entrance to the river being then extremely difficult.

River.

The Croix-de-Vie river is only practicable for small vessels, $10\frac{1}{2}$ feet being the greatest draught that can enter at high-water springs.

Tides.

The hour and height of high water, full and change, are the same as at the Sables d'Olonne. The approximate height of the tide can be obtained at any time by measuring with the eye the height of the rocks above water. For instance, the top of Boisvinet rock is 13 feet above the shoalest bar; if there be 5 feet of it out of water, there will be 8 feet on the bar.

Coast.

For $1\frac{1}{3}$ miles NW. by N. from Grosse Terre point, the coast is rocky, averaging 45 to 50 feet in height, and fringed with ledges projecting nowhere more than 330 yards. After making a slight inward curve, it then becomes sandy, and a large beach extends NW. $\frac{1}{2}$ W., $9\frac{1}{2}$ miles, after which it trends away to N. by W., and runs $4\frac{1}{2}$ miles to the Pointe de Notre Dame de Monts, the southern side of the entrance to the inlet of Fromantine, comprised between it and l'Île Noirmoutier.

Landmarks.

Back of the beach are downs of moderate height. Good landmarks are the steeples, the highest and nearest to the beach being those of Saint-Hilaire, Saint-Jean de Monts, and Notre Dame de Monts.

Off the whole length of coast just described, lies a plateau, with occasional rocky heads, increasing, toward the north, in extent seaward, reaching out as far as 4 miles between the elbow, $10\frac{1}{2}$ miles from Grosse Terre point, and the mouth of Fromantine inlet.

To the southward of Saint-Jean de Monts steeple, the coast may be approached quite closely in beating, save in one place, where the Basse de la Vigie forbids. On this shoal are two heads with $4\frac{1}{2}$ feet at low water. To remain clear of them keep the guard-house of Sauzey open at least 20° from Pilours rock.

La Vigie shoal.

From the bend in the coast-line, about 1 mile SW. by S. from the church of N. D. de Monts, a ledge projects SW. by W., which dries at low water to a distance of $1\frac{1}{2}$ miles, and $1\frac{1}{3}$ miles outside of which (SW. by W.) is another rocky head, which also uncovers.

Reef.

Les Marguerites are a chain of rocks extending to the westward from the coast abreast of N. D. de Monts, the outer one being $2\frac{1}{3}$ miles off shore. Outside of them is rocky bottom at slight depths, the $2\frac{1}{2}$ -fathom line being $3\frac{3}{4}$ miles from the beach; in a southerly blow the breakers extend out that entire distance. These rocks form the NE. border of the Pont d'Yeu.

Marguerites rocks.

The Basse de l'Aigle, over which is a least depth of $9\frac{1}{2}$ feet, is not a particularly dangerous shoal in fine weather, except to sailing-vessels beating in its vicinity at low water. It is a rock 1 mile in length north and south, distant $5\frac{1}{2}$ miles from the beach. Between it and the shore are not more than $19\frac{1}{2}$ feet of water, but outside of its western edge are depths of 5 to 8 fathoms. The bearings of its summit are Noirmoutier steeple on with the second mill on the Pointe de la Loire; and the steeple of N. D. de Monts south of and touching the mill just to the westward of it. The two *white* harbor-lights of Port-Breton lead over the E. edge.

Basse de l'Aigle.

Fromantine inlet reaches in between La Fosse point, the southern extreme of Noirmoutier island, and N. D. de Monts point on the main-land. A large shallow bay, fordable at every low water, extends to the northward, between the island and the coast, to the Baie de Bourgneuf. The inlet is not entered by any save small vessels intending to load salt in the channel of La Cahouette. In the anchorage are

Fromantine inlet.

depths of 13 to 15 feet of water, but the entrance is only practicable at high water, and, therefore, although land-locked and completely sheltered from all weather, it could scarcely ever be used as a port of refuge.

Tidal currents. The currents runs very strong in the channel, attaining a speed of 6 and 7 knots during spring ebb tides, at which time the inclination of the surface of the water is very appreciable. Vessels should always moor.

Entrance. The entrance is recognizable by a fort on the northern shore, and the mountains of Fromantine to the southward.

Landmarks. Besides mills, steeples, and flag-staves for landmarks to assist in entering, there are two beacons on La Fosse point, a tower on Boisvinet rock, a beacon on a rock in mid-channel, north of Boisvinet rock, and several buoys.

Directions. On approaching the entrance from the southward, the steeple of Barbâtre will be visible on Noirmoutier island, its spire towering above all the sand-dunes. Steer for it N. NE. until the two beacons of La Fosse come in line.

Coming from l'Ile d'Yeu, steer away from the base of the jetty of Port-Breton, bearing S. 32° W. tangent to the eastern side of the central fort. This course leads clear to the eastward of the Basse de l'Aigle. Or a vessel may keep Saint-Sauveur steeple, on Ile d'Yeu, S. 28° W., in line astern with the large rock 110 yards to the westward of Gautier point.

Coming from the westward it is best to approach with Beauvoir steeple to the northward of the most conspicuous house on La Fosse point, about E. by N.

All the above courses lead to within 2 miles of the beacons of La Fosse point, which are then distinctly visible. When they come in one, bearing N. 84° E., keep the alignment, which leads over the bar, until the NE. mill of the Barre des Monts comes near the end of the pier. Then port the helm and bring the mill gradually back to the inshore end of the pier, S. 82° E. This course leads to 425 yards from the pier, when run a short distance to the northward and eastward and anchor in 2 fathoms, (at low water,) sand and mud bottom.

Caution. The flood-tide sets on La Fosse point, and the ebb strong on Boisvinet rock and the Banc du Brillard, which always break.

Noirmoutier island is 10 miles long NW. by N. and SE. Ile de Noirmoutier. by S., and is of an exceedingly irregular shape, the width across the middle being not more than one-fourth mile, while near the northern end, at the Pointe de Devin, it is $2\frac{1}{2}$ miles. The area of the island is 70 square miles, of which one-fifth is cultivated. This latter part is very fertile, the rest of the surface consisting chiefly of pasture-lands and salt marshes.

The principal productions are salt, corn, beans, and a little wine. Productions.

The population of the entire island is about 7,000 souls. Population. The shores on all sides are studded with dangers.

From Fromantine inlet, the western coast of Noirmoutier Western coast. island, consisting of a continuous line of uncultivated sand-dunes, runs successively to the NNW., NW., and W., forming a bay about 6 miles across, called l'Anse de la Guérinière, the NW. extremity being the Pointe de la Loire.

The Anse de la Guérinière, which comprises properly Anse de la Guérinière. only the northern part of the bay formed by the curve in the coast, is sometimes entered by small coasters who come there to ground. It is very shallow, the 5-fathom line being $4\frac{1}{2}$ miles from the shore, and the $\frac{1}{2}$ -fathom line being in some places $3\frac{1}{4}$ miles off. There are also numerous rocks in the almost universal sand bottom, such as the Roches de la Loire, to the southward of the point of that name, and Le Caillon, $1\frac{1}{2}$ miles to the southward and westward of them.

At a distance of 3 miles NW. from La Loire point is Devin point, the western extreme of the island. Pointe de Devin.

The coast then follows a general northerly direction, with Pointe de l'Herbaudière. a slight inward curve, and terminates in the Pointe de l'Herbaudière, the NW. extreme of the island. A life-boat is stationed here. Life-boat.

All this portion of the coast is unapproachable because of the numerous outlying rocks.

The rocks extending off l'Herbaudière and Devin points Chaussée des Bœufs. form the Chaussée des Bœufs, and still bear witness to the extent of the island in probably the first centuries of our era. In the course of so many years, the sea has gradually worn its way inland, separating Pilier island. If the water be clear there can still be seen in different places, at various depths, the ruins of walls, possibly the last vestiges of the

Phœnician city that was founded off the mouth of the river Loire.

Le Bavard.

The Bavard rock is the southernmost of all these, and is marked by a large circular stone beacon or tower, fitted with an automatic fog-signal. This beacon is of great use not only because it is 3 miles from the coast, which at that distance is barely visible, but because vessels beating about with southerly breezes are often drifted into shallow water by the flood-tide, which sets on it, when the reckoning would put them several miles off. Rocks uncovering at low water extend $\frac{3}{4}$ mile SSW. from the beacon.

Caution.

Even if the weather be clear and the sea moderate, a vessel should not come nearer than 4 miles to the southward of the Bavard tower; and instead of relying on an estimated distance, bearings should be taken of Pilier light and Petite Foule light of Ile d'Yeu.

Directions.

To clear the SW. point of the Chaussée des Bœufs and keep in $5\frac{1}{2}$ fathoms at low water, the Petite Foule light should not be let bear to the southward of S. 15° E. while to the southward of the alignment of Bavard beacon and Noirmoutier castle. Beating about to the westward of the plateau, Pilier light should not be brought to bear to the northward of N. 40° E. (that is, it should never be open of Saint-Gildas point) while to the southward of Bavard beacon on with La Loire point or with the mills of Guérinière.

At night.

At night the Chaussée des Bœufs is easily avoided by observing the changes in the color of Pilier and La Chaise lights; while the former shows *white*, the vessel will be clear of the plateau, but should go about when it shows *red*. La Chaise shows *red* as long as the vessel is to the westward of the plateau, becoming *white* again $1\frac{1}{2}$ miles to the southward of Pilier islet.

Tidal currents
off the Chaussée
des Bœufs.

The currents off the Chaussée des Bœufs greatly enhance the danger of passing close to that shoal. The rotation of the tides is such that the flood will drift a vessel on the rocks throughout its continuance, as it sets right on them instead of following the trend of the coast.

Off the Pointe des Bœufs, as the extremity of the shoal is called, this rotation is with the sun, or with the hands of a watch. In calm weather, at low water, there is a feeble current running to the NW., but it quickly increases in

strength, turning to the north and northeast. The last of the flood sets SE., and almost the whole of the ebb to the SW. To the southward of the chaussée the early flood sets north, crossing the reef and entering the Loire river, and is strengthened by the current of the ebb from Fromantine inlet, which lasting for half an hour after low water, draws the waters from the bottom of the bay over the chaussée.

At a distance of $2\frac{1}{2}$ miles WNW. from l'Herbaudière point is Pilier island, a low rock 800 yards long NW. and SE., which occasionally affords a lee to coasters during W. or SW. winds. Pilier island

Vessels drawing not more than 9 feet can make Bourg-neuf bay through a channel between Pilier and Noirmoutier islands, called the Passe de la Grise or Passe de l'Herbaudière. This channel leads inshore of Les Pères, described farther on. Passe de Grise.

On the northern point of Pilier islet is a circular tower, 97 feet in height, showing a *fixed white* light, varied by a *flash* every 4 minutes, and with 2 *red* sectors. One of the *red* sectors covers the Chaussée des Bœufs, being seen when between the bearings of N. 10° W. and N. 34° E. The other covers the Couronnée shoal to the northeastward, being seen when between the bearings of S. 18° W. and S. 40° W. The light is elevated 105 feet above sea-level, and is dioptric, of the second order; the *red* rays are visible 14 miles and the *white* 16 miles in clear weather. Pilier light:
Lat. $47^{\circ} 02' 35''$
N.; long. $2^{\circ} 21' 43''$ W.

The light-tower is distinguishable from any other by the presence of a building, surmounted by a semaphore, to the southward of it. Geographical number of station B. G. P. T. Semaphore.

A reef, called the Chaussée des Chevaux, or simply Les Chevaux, projects 7 cables to the northward and westward from Pilier islet. Chevaux rocks.

From l'Herbaudière point the coast extends $2\frac{2}{5}$ miles to the eastward, to Pointe des Charniers, and for $2\frac{1}{3}$ miles to the northward of it are found rocks and shoal water. About midway between these two capes is Pointe de la Gardette, the northern extremity of the island. North coast.

Among the shoals off the north coast of Noirmoutier island are the following.

The Grand and Petit Sécés are rocks to the northeastward of Pilier island; on the former, $1\frac{1}{3}$ miles NE. by E. from Pi- Les Sécés.

lier light, is a red, white and black tower, making an excellent beacon, which should never be approached nearer than 1 mile.

Banc de la
Blanche.

The Banc de la Blanche, to the eastward of the Sécés tower, and $2\frac{1}{3}$ miles north of Gardette point, is covered by only 2 feet at low-water springs; it is limited in the north by the range of Sécés beacon a little open to the northward of the large rock of the Chevaux group, and in the east by Les Pères tower in line with Noirmoutier steeple. Coming in from seaward, the helm may be put to port immediately after passing the latter alignment.

Basse des Pè-
res.

To the northward of Charniers point are two shoals, called respectively the Roches des Pères and Basse des Pères, of which the latter is the outer, and has a red buoy on its head, 2 miles N. by E. from Charniers point. On the former is a round red beacon, somewhat similar to that of Les Sécés.

To the north-northeastward of the Basse des Pères, the surveys of Beauteemps-Beaupré place another shoal with only 11 feet of water, sand bottom. Subsequent searches have failed to discover anything less than $15\frac{3}{4}$ feet, rocky bottom.

Eastern coast.

The eastern coast of Noirmoutier island is about 10 miles in length, of extremely irregular conformation, and being fronted by a bank, fordable at every low water, separating Bourgneuf bay from Fromantine inlet, it is unnecessary to enter into its details.

La Chaise
light: Lat., $47^{\circ} 00'$
 $41''$ N.; long., 2°
 $13' 00''$ W.

About $1\frac{1}{2}$ miles SE. by E. from Charniers point, is La Chaise light, which is *fixed white*, with two *red* sectors. One of the latter illuminates an arc of 29° over the Chaussée des Bœufs, showing when between the bearings of N. 80° E. and N. 51° E. The second *red* sector shows when between the bearings of S. $\frac{1}{2}$ E. and W. by S. It is a dioptric light, 112 feet above the sea-level, visible 10 miles, and exhibited from a square tower 52 feet high, the SE. and SW. faces of which are painted *red*. The light is sometimes called the light of Les Dames de Noirmoutier, being on the point of that name.

Town of Noir-
moutier.

The town of Noirmoutier is small, and of but little importance, having a population of only 2,500 souls. It is $1\frac{1}{3}$ miles SW. from La Chaise light, at the head of a small bay on the eastern shore of the island. At low-water springs only 2

feet can be taken over the bar, but nearer the town the depths are 6 feet greater.

Bourgneuf bay is no longer of the same maritime importance as before the introduction of steam-power in navigation; but still it may be considered from various points of view. There are safe anchorages in it for large vessels, in bad as well as in good weather, and it is extremely convenient for small craft that can run to the southward inside Noirmoutier island, and put to sea through Fromantine inlet.

The eastern shore of Bourgneuf bay, or the coast of the main-land, extends about NE. by N. $10\frac{3}{4}$ miles, from Fromantine inlet to the anchorage of Bourgneuf, the little town of that name being a mile inland. The coast then trends to the northwestward $7\frac{1}{2}$ miles, to the little port of Pornic, a large portion of which dries at low water, but which has nevertheless attained some importance, being a resort for sea-bathers. Signals showing the height of the tide are made from the flag-staff near the light.

On La Noveillarde point, the western extremity of the entrance to the harbor of Pornic, is a square tower, 36 feet high, with dwelling attached, from which is shown a *fixed white*, dioptric, fourth-order light, elevated 66 feet above sea-level, visible 10 miles.

At Pornic the coast becomes somewhat higher, and runs W. by N. $5\frac{1}{2}$ miles to Saint-Gildas point, the northern extremity of the mouth of Bourgneuf bay, and the southern of the mouth of the river Loire. It is distinguishable by a semaphore.

The navigation of the extensive bay of Bourgneuf is much impeded by rocks and shoals.

La Couronnée shoal, $2\frac{1}{2}$ miles WSW. from Saint-Gildas point, was the scene of not a few marine disasters before the establishment of the *red* ray of Pilier light. One rocky head protrudes about 6 feet above low water, and on several adjacent spots are depths of only 5 to 8 feet. The bearings of the principal head are the guard-house of Bedauni N. $60^{\circ} 30'$ E., under a mill on the coast 2 miles NE. of Saint-Gildas point, and a rock, called the Pierre Percée, N. $13^{\circ} 40'$ W., a little open to the westward of the downs of Escoublac, on the northern shore of the entrance to the Loire.

Baie de Bourgneuf.

Main coast.

Pornic.

Pornic light:
Lat. $46^{\circ} 06' 38''$
N.; long. $2^{\circ} 07' 02''$ W.

Saint-Gildas point.

Dangers.

Basse La Couronnée.

Buoy. The shoal is marked by a large buoy a little to the westward of it.

The white spire of La Plaine, on with a point a little to the southward of Saint-Gildas semaphore, leads clear to the northward. With the steeple over the semaphore, the course can be kept right on up to the shore.

Banc des Kérouars. Kérouars bank is in a line of shoals extending to the eastward of La Couronnée, parallel to the coast. Its total length, including the latter rock, is $5\frac{3}{4}$ miles, with an average width of one half mile, and general depths varying from 1 to 3 fathoms, over sand; there are several patches, however, of rock, at 3 to 4 feet.

The beacon of Notre Dame bank, bearing S. 85° E. in line with the white steeple of La Bernerie beyond, leads clear to the southward.

To the northward of the bank, the depths off Saint-Gildas point are as great as 6 fathoms, diminishing gradually to 3 fathoms near the eastern end.

Basse Notre Dame. Immediately in front of Pornic is a bank called the Basse Notre Dame, the western extremity of which is 1 mile ESE. of Kérouars bank. It consists of a series of rocks, many of which uncover at low water, which skirt the coast at a distance of $1\frac{1}{2}$ miles. There is no passage inshore of the eastern end, because of the projection of rocky ledges, called the Roches de la Bernerie.

Beacons. There is a beacon on La Dame bank, and another on Le Caillou, a rock to the eastward of it, but practically forming one of the chain.

Pierre-Moine. The Pierre-Moine is a somewhat dangerous rock $2\frac{1}{2}$ miles NE. from Charniers point, with a circular tower built upon it, making a good landmark in the daytime. The top of the rock is 3 feet above the highest springs.

Pierre du Chenal. The Pierre du Chenal is an outlying rock, drying 2 feet at low water, $2\frac{1}{3}$ miles SSW. from Pornic light.

Head of the bay. The head of Bourgneuf bay, from a little SE. of Pornic, is bordered all around with shallow water, and the southern part dries at low-water springs.

Tidal currents. The action of the tides in the bay is very similar to that in the Pertuis d'Antioche, Fro nantine inlet (like the Pertuis de Maumusson) giving passage to a tide-wave less high than the one that doubles the north end of the island.

In the middle of the bay the currents flow to every point of the compass-card, turning with the hands of a watch. At half-flood it sets east with a speed of 1 knot, which diminishes as the direction changes to south. In the middle of the bay.

The half-ebb flows west with a velocity slightly greater than that of the flood.

There is high, as well as low, slack water.

In the northern part of the bay, near Saint-Gildas point, they reach their maximum velocity, of 2 knots, flowing parallel with the coast, that is, ESE. during the flood and WNW. during the ebb-tide. The latter continues to make for half an hour after low water. Near Saint-Gildas point.

Advancing into the bay, the currents have a tendency to follow the general direction of the rocks and shoals.

Near La Chaise anchorage they follow the coast-line; the ebb begins to make before high water.

It is high water, full and change, at Noirmoutier, at 3^h 2^m. Mean spring rise, 16 feet; mean neap rise, 11½ feet; mean neap range, 7 feet. Tides.

Toward the head of the bay the heights of the tide increase, being 1 foot greater at springs in the channels of Le Colet than off La Chaise light.

There is also considerable retardation in the propagation of the tide-wave throughout the bay. At Pornic high water occurs at the same moment as at La Chaise, but at the head of the bay it takes place 20 minutes later. Retardation.

There are three excellent anchorages for large vessels in Bourgneuf bay: 1st, south of Pierre-Moine; 2d, in the Chenal du Centre; 3d, in Le Fain. The last is the safest of the three, but can be reached only at high water by vessels drawing 29½ feet. The anchorage of La Chaise is very convenient for vessels of lighter draught. Anchorages.

In the anchorage south of Pierre Moine is a depth of 5½ fathoms at low water, over sand and mud, on the cross-bearings of Les Pères beacon in one with Pilier light tower, and Pierre-Moine tower in line with the semaphore on Saint-Gildas point. South of Pierre-Moine.

For large vessels the anchorage is very good during all bad weather save a NW. gale, which would raise quite a heavy sea between there and Croisic. Vessels so large as not to be able to cross the bar of the Loire in heavy weather find this a convenient, as well as safe, port of refuge.

Directions.

Heading in from seaward, having made Pilier islet and Gildas point, (both of which are recognizable by a semaphore,) steer for the latter N. 50° E. if it be smooth weather and high water; otherwise bring the steeple of La Plaine (the spire of which is *white*) to bear N. 68° E. over the village of Préfaillies. The latter range leads clear to the northward of the plateau forming the base of Pilier islet and the other rocks in its vicinity. Whichever of the two ranges be used, when the tower on Pierre-Moine bears midway between Bourgneuf and Bouin steeples, both of which are distinctly visible at the head of the bay, port the helm to steer S. 74° E. for Pierre-Moine. When about 3 cables from it, head for Beauvoir steeple, about SE. by S., and anchor after making half a mile on that course.

At night.

At night, head in on the alignment of the *fixed white* light of Aiguillon, and the *white fixed and flash* light of Commerce, on the north side of the mouth of the Loire, until the *fixed white* light of La Chaise comes in line with the *white fixed and flash* light on Pilier. Then change the course to N. 67° E. for 5 miles, after which a S. 66° E. course will lead toward Pierre-Moine.

Should the weather be clear enough to see the beacon on the latter, anchor 3 cables to the southward of it. In dark weather, the minute La Chaise light shows *red*, change course from S. 66° E. to SE., run three-fourths of a mile, and anchor.

Using the sextant.

It being rather delicate work to make all these different courses, even though the compasses be excellent, and also difficult to make proper allowance for the tide in running the distances given, the use of a sextant would simplify matters very much. With this intention, keep on the range of the Aiguillon and Commerce lights, and only put the helm a-port in time to head SE. for La Chaise light, with La Banche exactly astern, (the two being on that bearing from each other.) Then clamp the vernier of the sextant at 88° and observe La Chaise and Pilier lights. When they coincide in the horizon glass, which will be when the latter shows *white* again after the *red* sector is passed, starboard the helm and steer E., then E. by S., ESE., and so on to SSE., keeping the two lights in one in the horizon-

glass. An arc of a circle will thus be described, without fear of error.

Come-to when Pilier light bears west.

The Chenal du Centre is long but quite narrow, and on that account is hardly practicable by night. The eastern ^{Anchorage in the Chenal du Centre.} part of it is the best sheltered and can be reached by passing either to the northward or to the southward of Pierre-Moine. In the former case $5\frac{1}{2}$ fathoms will be the least water found, while in the latter, a 20-foot bank will have to be crossed to the SE. of Pierre Moine.

To pass to the southward of Pierre-Moine steer for that ^{Directions.} beacon, S. 74° E., midway between Bonin and Bourgneaf steeples, until about 3 cables from it. Then round it gradually, keeping at the same approximate distance, and steer S. 86° E for the steeple of Saint-Cyr-en-Retz, which will first appear on the horizon, over the northern extremity of the woods of Colet, anchoring when Pornic light-tower passes to the left of La Motte mill, the highest in that neighborhood.

The depth on that cross-bearing is 8 to 9 fathoms.

To pass to the northward of Pierre-Moine, approach as before, rounding to the northward of the beacon, and then steering S. 33° E., with Guérande steeple astern over the semaphore on Saint-Gildas point. When Les Pères tower comes in line with Pilier light, starboard the helm and steer S. 88° E. for 2 cables, and finally port the helm just a little to anchor on the ranges given above.

This anchorage is better than that of Pierre-Moine during NW. winds, as the shoals break the force of the sea.

The anchorage in Le Fain, an extension of deep water ^{Le Fain anchorage.} into the sands of the southern portion of the bay, will berth large vessels, but whatever channel be taken to reach it, a bar has to be crossed.

By taking the centre channel, $16\frac{1}{2}$ feet will be the least depth found at low-water springs; if the Chenal de la Pierre be taken, $15\frac{3}{4}$ feet will be found.

If it be decided to use the former, approach Pierre-Moine, ^{Entering through the Chenal du Centre.} as directed above, and leave it to the northward, heading for Saint-Cyr steeple over the middle of the woods of Colet. Keep this alignment until Le Caillou beacon comes in line with the mill of La Motte at Pornic. Then steer S. 48° E.

for the steeple of Bouin; the outer beacon off the channel of Les Brochets should be open 1° to the left of the steeple, but as it is not distinctly visible it may be necessary to rely on the compasses. The last range leads over the $16\frac{1}{2}$ -foot bar in a place where the channel is very narrow.

When La Motte mill is seen above and between two houses that will be seen quite near each other, steer away on that range and anchor when Saint-Cyr steeple touches the northern edge of La Coupelasse mill.

The depth there is $5\frac{1}{2}$ fathoms over mud.

Entering
through the Che-
nal de la Pierre.

The route through the Chenal de la Pierre has the advantage of being made on easier ranges. From the offing steer E. for the steeple of La Bernerie, passing $1\frac{1}{2}$ miles N. of Pierre-Moine. On approaching the former it will be seen to be over the beacon of Le Caillou.

When three-fourths mile from the latter, port the helm and steer S. 37° E. away from the steeple of La Plaine over Notre Dame beacon. Three miles on this course will bring the beacon of Longeterre slightly open to the westward of the mill of Malchaussée. Keep the two latter in that relative position, and after passing the bar, with depths of $15\frac{1}{2}$ feet, (at low water,) make the alignment perfect, and anchor on the cross-bearing of Saint-Cyr steeple touching the N. edge of Coupelasse mill.

The anchorage in Le Fain is safe in all weathers, and large enough to berth several vessels of heavy tonnage. The currents never exceed $2\frac{1}{2}$ knots in strength.

Communication with the shore is made at half-tide in the channels of La Louippe and Les Brochets.

Anchorage of
Bois de la Chaise.

In the anchorage of Bois de la Chaise is a depth of $16\frac{1}{2}$ feet, and it has the advantage of being more immediately under the lee of Noirmoutier island.

Directions.

Entering Bourgneuf bay in ordinary weather, it will suffice to pass 1 mile to the northward of Pilier island and the Sécés tower, but in heavy weather it would be advisable to give them a wider berth. In northwesterly weather they should not be approached nearer than 2 miles—keeping La Plaine steeple N. 68° E. over Préfailles village; then steer for Pierre-Moine beacon, midway between Bouin and Bourgneuf steeples, until La Chaise light-tower passes over the Tour Plantier, a tall cylindrical structure near the shore.

This latter range, SSE., leads in to the westward of the Basse des Pères.

To take a vessel in drawing 14 or 15 feet, the last alignment should be left before La Blanche ruin (E. of La Gardette point) comes in line with the mill of l'Herbaudière, and the course should be shaped to bring La Chaise light $2\frac{1}{2}$ points off the starboard bow, letting go the anchor when Pierre-Moine beacon is in range with La Plaine steeple beyond.

Follow the directions given for using the sextant in entering the anchorage of Pierre-Moine, coming to when Pilier light is shut in by Charniers (or La Madeleine) point. At night.

In case the weather be clear and it be preferred to use the compass, leave the alignment of Le Commerce and l'Aguillon lights; when those of Pilier and La Chaise are in one, steering N. 70° E. for 4 miles, or until Pilier light shows *red*. Then steer E., with Pornic light 1 point off the port bow until that of La Chaise bears S. by E. and begins to show *red*, which will be after making about $4\frac{1}{2}$ miles. Change course immediately, heading for the latter light and keeping as nearly as possible on the limit of the uncertain light separating the *white* and *red* sectors. Anchor before Pilier light is hidden.

The Banc de la Chaise is the northern limit of the anchorage and has but 3 feet on one head at low water. The bearings of that shoal spot are: Noirmoutier steeple, (seen from the rigging,) between Le Cob point and Plantier tower, and La Plaine steeple touching the western extremity of the rocks of Pierre-Moine. La Chaise
bank.

By keeping Noirmoutier steeple in line with La Chaise light the bank will be crossed with a least depth of $14\frac{1}{2}$ feet. To the southeastward the soundings increase gradually. The mills of Nicou shut in by Saint-Pierre point, lead in to the westward of it.

The river Loire, the longest in France, rises at the foot of Gerbier des Jones, among the Cevennes mountains, in the department of Ardèche, and flows in a general north-westerly direction to the city of Orléans, when it bends somewhat to the southward, and after a total course of upward of 600 miles, falls into the bay of Biscay. River Loire.

In its upper course the river is a romantic mountain tor-

rent; as it descends, its valley widens and embraces extensive plains, so richly covered with orchards, vineyards, and corn-fields, that they have justly received the name of the garden of France. The basin of the river is estimated as one-fourth part of the whole republic.

It becomes navigable at Roanne, about 450 miles from the mouth, and passes the flourishing towns of Orléans, Blois, Tours, Saumur, and Nantes. The navigation is interrupted, however, during 4 or 5 months in the year by frosts and by floods. To obviate some of the difficulties incidental to the navigation, a lateral canal, 123 miles long, has been cut along part of its course, extending from the Canal du Centre to the Canal du Briare. The Loire communicates with the Rhone and Seine, also, by means of canals. Its affluents are numerous and important, many of them being navigable; those on the right are the Arroux, Nièvre, Maine, (formed by the union of the Mayenne and the Sarthe;) on the left the Alliet, Loiret, Cher, Indre, Vienne, Thoué, and Sèvre-Nantaise.

To prevent the Loire from spreading over the low grounds along its course, it has been banked in by dikes, built much above its ordinary level. These dikes were never known to give way previous to the great floods of 1846; they also gave in at the same place in 1856, carrying away the bridge and village of Savounières, inundating the communes of La Riche-Extra and La Chapelle-aux-Naux, causing a dreadful loss of life and property.

Dangers.

Besides the numerous permanent banks and islands in the river, the soil brought down by the current forms shifting banks which greatly impede navigation and necessitate taking at least a river-pilot.

Mouth.

The mouth of the Loire is $6\frac{1}{2}$ miles wide from Saint-Gildas point to Pointe de Chémoulin opposite, though the entrance may well be considered as being embraced by the former and the Pointe du Croisic, $15\frac{1}{2}$ miles NW. $\frac{3}{4}$ W. The river bar is between the two former.

In the mouth are many shoals which greatly diminish the working room.

Les Charpentiers.

At the distance of one-half mile SSW. from Chémoulin point is the bank of Les Charpentiers, forming the northern limit of the river bar; the bottom is sand at 7 feet on the

outer edge. In the western part, bearing respectively south and north from each other, are Le Grand Charpentier and Le Petit Charpentier, both of which uncover at low water, and on each of which is a *black* tower-beacon.

At about three-fourths of a mile NW. by N. from Le Grand Charpentier is a sand-bank called the Longue Folle, with 5 feet of water on it. It is a connecting link between the Charpentiers and the chain of rocks extending to the south-eastward of Pain Château. Longue Folle.

On the SE. part of the bar is the Roche-du-Vert, with $5\frac{1}{4}$ feet on it. One hundred and forty yards WSW. of the shoalest spot is a red buoy. Roche-du-Vert.

The plateau of Les Jardinets comprises 4 rocky heads, the eastern and western of which uncover respectively $3\frac{1}{2}$ and $2\frac{1}{2}$ feet. Being to the southward and eastward of Le Vert, it is not much to be feared by vessels even beating in. Les Jardinets.

La Truie rock stands in 9 feet of water, $1\frac{1}{2}$ miles east of Les Jardinets, and is made more conspicuous by a beacon. La Truie.

The Banc des Morées forms the SE. limit of the channel up to abreast of Ville-és-Martin; on the NE. head is a round tower-beacon, called the Tour des Morées. The depths on the bank vary from 1 to 9 feet. Banc des Morées.

The ebb-tide is very apt to set a vessel on the Banc des Morées; the drift should be carefully watched. Caution.

The southern shore of the river runs from Saint-Gildas point, which is recognizable by a semaphore, $2\frac{1}{2}$ miles NE., and after an inward curve continues nearly north $6\frac{1}{2}$ miles to the point and fort of Mindin, opposite the town of Saint-Nazaire. This is sometimes called the mouth proper of the river, the width being $1\frac{1}{4}$ miles. It is proposed to establish a *fixed white* light here, which would be very welcome to navigators. Mindin point.

As it is, the first light on the southern shore of the Loire is on the extremity of a mole at Paimboenf, $4\frac{3}{4}$ miles ENE. $\frac{3}{4}$ E. from Mindin point. It is a *fixed white* light, 26 feet above sea-level, visible 8 miles, exhibited from a circular stone tower. The illuminating apparatus is dioptric of the fourth order. Paimboenf light: Lat. $47^{\circ} 17' 25''$ N.; long. $2^{\circ} 02' 02''$ W.

At Méans are two harbor-lights; one, exhibited from the church-tower, 34 feet high, is a *fixed white* light, 37 feet above Méans lights: Lat. $47^{\circ} 18' 05''$ N.; long. $2^{\circ} 11' 06''$ W. E. light.

sea-level, visible 5 miles. The other, exhibited from an iron post, 18 feet high, 348 feet eastward from the former, is a *fixed red* light, 20 feet above sea-level, visible 5 miles. The illuminating apparatus of each is dioptric. In line, the two lights lead into the harbor.

Saint-Nazaire
light: Lat. $47^{\circ} 16'$
 $18''$ N.; long. 2°
 $11' 56''$ W.

On the new mole head of Saint-Nazaire is a circular tower 18 feet high, exhibiting, at an elevation of 26 feet above the level of the sea, a *fixed white* dioptric light of the fourth order, visible 8 miles.

Basin lights.

On either side of the entrance to the basin is also a small light; one *red* and the other *green*.

Ville-és-Martin
light: Lat. $47^{\circ} 15'$
 $21''$ N.; long. 2°
 $13' 46''$ W.

On the point at Ville-és-Martin, $1\frac{2}{3}$ miles SW. by S. from Saint-Nazaire light, is a *red revolving* light, attaining its greatest brilliancy every 30 seconds. It is a dioptric light of the third order, visible 12 miles, elevated 33 feet above sea-level, exhibited from a circular stone tower, 41 feet high; within 4 miles the eclipses are not total.

Tour du Com-
merce light: Lat.
 $47^{\circ} 15' 28''$ N.;
long. $2^{\circ} 15' 04''$ W.

The Tour du Commerce is a circular structure 108 feet high, from which is exhibited, at an elevation of 197 feet, a *white* light, *fixed* but varied every 2 minutes by a flash, preceded and followed by a short eclipse. These eclipses are not total within 6 miles in ordinary weather. The illuminating apparatus is dioptric, of the third order; the light is visible 14 miles.

Tour d'Aiguil-
lon light: Lat.
 $47^{\circ} 14' 33''$ N.;
long. $2^{\circ} 15' 51''$
W.

At a distance of 2,144 yards S. 32° W. from the Tour du Commerce is the Tour d'Aiguillon, a circular structure, 67 feet high, showing a *fixed white* light, elevated 118 feet above sea-level, visible 14 miles. The illuminating apparatus is dioptric, fourth order.

Pointe de l'Eve
light: Lat. $47^{\circ} 14'$
 $30''$ N.; long. 2°
 $16' 05''$ W.

About 325 yards S. 70° W. from the latter, on the Pointe de l'Eve, is a *fixed red*, catoptric, fourth-order light, 103 feet above sea-level, visible 9 miles, exhibited from a watch-tower 10 feet high. This light only illuminates an arc of 30° , being visible in the WSW. from the channel of Ville-és-Martin. By keeping it masked by the Tour d'Aiguillon a vessel remains in mid-channel. A black buoy marks the extremity of the bank of Pointe de l'Eve.

Proposed ligl ts.

At Pierre-à-l'Oeil is a stone tower, from which it is proposed to show a *fixed white* light. On l'Ile Saint-Nicolas, nearly midway between Mindin point and Paimboeuf, is a

circular stone tower from which it is proposed to exhibit a *fixed red* light.

At a distance of $1\frac{1}{3}$ miles ESE. $\frac{1}{2}$ E. from Pointe de l'Eve Coast. is Chémoulin point, marked by a semaphore. The dwelling of the semaphore is painted yellow. Geographical number, B. R. S. P. The coast from there trends to the northward and westward to Le Pouliguen, rounding back to the southward to Pain Château point, forming a rather shallow bay. This coast, composed of extensive sand-downs, back of which are to be seen the mill and church of Escoublac, is fringed by a chain of rocks from $1\frac{1}{2}$ to 2 miles off shore, extending to the SE. from Pain Château point. One of these, La Pierre Percée, 2 miles WSW. $\frac{1}{2}$ W. from Chémoulin point, is frequently used as a landmark. It derives its name from the peculiar aperture through it, reaching some distance above high water. Its top is 30 feet above low water.

On the extremity of the jetty, at Le Pouliguen, is a *fixed* Le Pouliguen
light: Lat. $47^{\circ} 16'$
 $27''$ N.; long. 2°
 $25' 23''$ W. *white*, dioptric light, elevated 23 feet above sea-level, visible 5 miles, exhibited from a lamp-post 18 feet high. Its are of visibility is limited by Chémoulin and Pain Château points.

La Branche bank, right off the entrance to the river, is an La Branche. extremely dangerous place. It is $3\frac{2}{3}$ miles long NW. and SE., and about $1\frac{1}{2}$ miles broad, marked by a light on Le Turc rock, and a small tower to the northwestward of the light.

At the NW. extremity of the plateau is a rock, called, Roche du N. O. from its relative position, Roche du N. O., marked by a red buoy. Over it is a depth of $8\frac{1}{2}$ feet, and its bearings are the steeple of Escoublac, just inside Pain Château point; and La Branche tower (not the light-tower) open to the westward of the woods of La Chaise on Noirmoutier island, and nearly touching the light-tower on Le Turc.

At the SE. extremity is also a rock, named the Roche du Roche du S. E. S. E. It is $1\frac{1}{6}$ miles ESE. from the light-tower, and has $7\frac{1}{4}$ feet on it at low water. It is to be marked by a black buoy. The ranges are Pierre-Percée, under the mill of Poulhaut, NE. by E. $\frac{3}{4}$ E., and Guérande steeple, over that of Saillé. Aiguillon light is also over Petit Charpentier tower.

The other rocks are Le Turc and Les Trois Pierres. The former dries 10 feet at low water. The latter, extending

from 1 to $1\frac{3}{4}$ miles to the northwestward of Le Turc, also uncover 10 feet. The depths over the remainder of the plateau are very variable, some spots showing at low water and others being at 3 fathoms.

La Banche
light: Lat., $47^{\circ} 10'$
 $39''$ N.; long., 2°
 $27' 50''$ W.

On Le Turc rock, of La Banche shoal, is a *fixed red* light, elevated 70 feet above the level of the sea, visible 10 miles, exhibited from a stone tower 87 feet high. The pilots say the light is poor; and, in point of fact, its height above water would admit of its being seen several miles beyond its actual range.

To the southward, westward, and northwestward of La Banche are three shoal spots, called the Basse du Turc, Basse de l'Astrolabe, and Basse Milhaud, covered respectively by 5, $4\frac{1}{2}$, and $4\frac{1}{2}$ fathoms water, and, respectively, $1\frac{5}{6}$ miles S. 25° W., $3\frac{5}{6}$ miles S. 85° W., and $5\frac{1}{3}$ miles N. 62° W. from La Banche light.

La Lambarde.

La Lambarde bank, which is $1\frac{3}{4}$ miles long, is just outside the line between Saint-Gildas and Croisic points, 5 miles from the former, and lies to the eastward of Le Turc rock. It is separated from the SE. rock of La Banche by a channel 2 miles wide. One head dries 2 feet at low water, but on the others are depths of 8 and 11 feet. The ranges of the former are Saint-Nazaire steeple, N. 50° E., open about 2° to the southward of Aiguillon tower, and the light-tower of La Banche, $3\frac{5}{6}$ miles N. 86° W. Off the SE. extremity is a bell-buoy.

Wreck.

About 1 mile eastward of the buoy is the wreck of the English steamer Nada, indicated by another buoy, painted with black and red horizontal stripes.

Coast.

From Pain Château point the coast runs $5\frac{3}{4}$ miles to the WNW., to Croisic point, and is tolerably clean, the Basse Lovre being the only rock to be found at any distance from the shore. The latter is 7 cables from the coast, bearing SW. by S. from the steeple of Bâts. It is buoyed, and has 3 feet on it at low water.

Basse Lovre.

Croisic point.

Croisic point is rather low, as is also the neighboring coast, but several landmarks distinguish it perfectly, among which are the tall, pointed spire of Guéraude, far inland, the tower of Bâts church, quite near the coast, 3 miles S. 72° E. from Croisic point, and Croisic steeple.

Landmarks.

To the NW. by W. of the point are many outlying dn-

gers. The Basse Castouillet, composed of a cluster of rocks, projects 1 mile to the northwestward of it, with no channel inshore.

The Basse Hikérie is a rock 1 mile to the westward of the latter, and is but little above the level of the adjacent mud and clay bottom, having 27 feet on it at low water.

At a distance of 492 yards NNW. from the church of Croisic is a *fixed white*, catoptric, fourth-order light, 13 feet above sea-level, visible 6 miles, exhibited from a pole 20 feet high. South-southeast 50 yards from it is a *similar* light, 33 feet above sea-level, visible 12 miles, exhibited also from a pole 20 feet high. They only illuminate an arc of 15° , and when in line SSE., lead over the tail of the Crasse du Grand Mabon.

Croisic lights:
Lat. $47^{\circ} 17' 58''$
N.; long. $2^{\circ} 31' 05''$ W.

On the extremity of Tréhic jetty is a stone tower, 34 feet high, showing, at an elevation of 39 feet above sea-level, a *fixed red* light, with a *white* sector. The *white* ray shows when between the bearings of E. $\frac{1}{4}$ S. and SE. $\frac{1}{4}$ S. The illuminating apparatus is dioptric, of the fourth order. The light is visible 10 miles. It is screened by the land when bearing north of NE.

Tréhic jetty
light: Lat. $47^{\circ} 18' 30''$ N.; long. $2^{\circ} 31' 31''$ W.

The Plateau du Four lies from $3\frac{1}{2}$ to $4\frac{1}{2}$ miles to the westward of Croisic point. It is 3 miles long N. and S., and $1\frac{3}{4}$ miles broad, the rock, at $5\frac{1}{2}$ fathoms, changing suddenly to mud and clay at 9 fathoms inshore and 16 fathoms outside of it. On the plateau are a number of very shoal patches, at depths of 4 to 13 feet, and in the northern part is a long rock, uncovering at low water. On the NW. extremity of the plateau is the Bonen du Four, marked by a buoy.

Plateau du
Four.

On the long rock in the northern part of the Plateau du Four is a circular tower, 92 feet high, showing a *white revolving* light, attaining its greatest brilliancy every 30 seconds. The illuminating apparatus is dioptric, of the second order, and the light, elevated 79 feet above sea-level, is visible 18 miles. In ordinary weather the eclipses are not total within 8 miles.

Le Four light:
Lat. $47^{\circ} 17' 53''$ N.; long. $2^{\circ} 38' 11''$ W.

Just clear of the southern border of the Plateau du Four is a 5-foot shoal, marked by a black bell-buoy on the south edge. It is called the Gouëvas.

The Banc de Guérande is a rocky plateau, $5\frac{3}{4}$ miles in length NNW. and SSE., situated to the southward and

Banc de Gué-
rande.

westward of Le Four. Nothing less than 5½ fathoms will be found on it, except over the Basse Capella, the northern extreme. Over the latter the depth is 3⅔ fathoms at low water.

Northwest of it are the Basse Fournier and Basse Guérin, whose rocky bottom is but slightly elevated above the sand, gravel, and clay in the vicinity.

Bar of the Loire.

The bar which has to be crossed to enter the river Loire is between Chémoulin and Saint-Gildas points, the outer edge being 1½ miles to the southward of the former. It is ordinarily called the Barre des Charpentiers, from the bank that limits it in the W. The least depth at low-water springs is 11¾ feet, but at high-water springs there is sometimes a depth of 5¼ fathoms. The time of high water is 15 minutes before that at Saint-Nazaire, and the height is practically the same. The height of low water is sometimes a little less than that of Saint-Nazaire.

Tides.

It is high water, full and change, at Saint-Nazaire at 3^h 40^m. Mean spring rise 16 feet; mean neap rise 11¼ feet; mean neap range 7 feet. Springs sometimes rise 20 feet.

Following is a table giving the different heights of high water at different points in the river, and the retardation in the propagation of the tide:

	Saint-Nazaire.	Paimbœuf.	Migron.	Pèlerin.	Basse-Indre.	Nantes.
	<i>h. m.</i>	<i>h. m.</i>	<i>h. m.</i>	<i>h. m.</i>	<i>h. m.</i>	<i>h. m.</i>
Times ..	0 00	0 45 ret.	1 00 ret.	1 30 ret.	1 55 ret.	2 25 ret.
Heights. {	18 feet.	19.2 feet.	19.0 feet.	19.0 feet.	19.0 feet.	18.8 feet.
	16.4 feet.	17.3 feet.	17.2 feet.	17.2 feet.	17.2 feet.	17.0 feet.
	13 feet.	13.2 feet.	13.2 feet.	13.2 feet.	13.1 feet.	13.1 feet.

The heights given obtain only when the river is tolerably low; during a rise in the river they would be very different. The retardation is not much affected.

Tidal currents off the mouth.

It may be generally stated that the tides enter the Loire principally through the southern channel and go out through the northern. But this general set is greatly influenced, and at times even nullified, by various causes.

Flood-tide.

In the Chenal du Nord, abreast of Bâts, the early flood runs ESE., and off the SE. point of Le Four, ENE., the line from Gouëvas buoy to Bâts church seeming to be the line of demarcation between the two currents, influenced

on one hand by Quiberon bay to the northward, and on the other by the Loire.

Off the rocks inclosing Pouliguen bay, the flood has a tendency northeastward; off the Charpentiers bar, it sets ENE. and E., while farther S., being influenced by Bourgneuf bay, it runs to the eastward and sometimes even to the southeastward.

The winds also affect the set of the currents. With a northeasterly wind, if a vessel, beating, were to be off Le Four plateau during the early flood, it would be advisable to make a long board to the northward of it, as the tide would set her more to windward there than would be the case off La Banche. But with E. or SE. winds the strength of the easterly current would be greatest to the southward of the latter.

During the ebb-tide the currents follow very similar rules. Ebb-tide.
In the northern channel the direction is steady at NW., while to the southward of Le Four rocks it runs WSW., WNW., and finally NW., when it attains its maximum speed of $2\frac{1}{2}$ knots.

Abreast of Pouliguen, during the first hour, the set of the ebb is influenced by the waters of that bay, being at first SSW., then W., and NW. South of Les Charpentiers it flows SW. for 3 hours, finishing at W.

It follows that vessels beating out against NW. winds, with the ebb-tide, would do well to take the northern channel, as the whole tide sets to windward. With southerly winds Pilier islet should be hugged.

The turn of the tide takes place practically at the same time everywhere in this immediate vicinity. It is slack water for 40 minutes after low water, and only for a few minutes after high water, outside the mouth of the river. Turn of the tides.

During neap-tides the currents outside have a velocity of only 1 or $1\frac{1}{2}$ knots, in place of 2 and $2\frac{1}{2}$ knots at springs. Strength.

It is a noticeable fact that the surface current of the ebb is stronger than the same of the flood, and that the directions of the lower currents precede by a half-hour those of the surface currents, the turning of the tides at the bottom of the channels taking place exactly at high and low water.

The flood-tide has a tendency to set on and near Mindin point, and the ebb-tide to follow the north shore. Near Le Currents in the river.

Pointeau (a cape 2 miles south of Mindin) the current sets to the northward for 7 hours, and there are only 5 hours of ebb. At Saint-Nazaire and Bonne Anse, the ebb runs for $6\frac{3}{4}$ hours.

So that vessels beating in with the flood-tide should stand on as far as possible toward the shore between Saint-Gildas and Mindin points.

At springs, during a rise in the river, the ebb runs at the rate of 5 knots past Saint-Nazaire, setting on the Vignettes and Morées banks; under those circumstances a sailing-vessel should not get under way without a good, steady working breeze.

The only danger to be looked out for during the flood-tide is, that it may drift a vessel on the Basse de Saint-Nazaire, off that town.

During heavy freshets in the river, the surface current of the ebb does not turn at all during the day, but the salt undercurrent of the flood works up and will swing ships of large draught.

Neither the time nor height of high water at Saint-Nazaire is much influenced by the rising of the river. The height of low water only is slightly increased.

General directions for approaching the coast.

The advantages of making Belle-Ile are so great that all vessels approaching the coast should endeavor to make that land-fall. The advantages are, that they would be approaching a bold coast with no outlying dangers; that in case of a gale coming on, they would be within striking distance of a good lee, from which communication can be had by signals with their agents, and that the range of Belle-Ile light is 27 miles.

Caution.

Under certain circumstances certain precautions have to be taken. With the wind from S. or SE., the course should be shaped on a parallel 6 miles south of that of Belle-Ile light, the current in the offing making about that much in one tide. If the wind be in the east or in the west, the northerly drift will be 2 or 3 miles, and allowance should be made for that much; finally, in case of a NW. breeze, the drift would be little or nothing.

In case of good clear weather, and if the position be well established, either Pilier or Belle-Ile lights could be made by a sailing-vessel, according to the direction of the wind.

Making the land-fall during the day-time, Belle-Ile will appear, at 20 miles distance, to be divided into three parts, which will gradually join and be seen to be covered with numerous mills, all overlooked by the tall light-tower. In day-time.

Should the position be so uncertain, from lack of previous observations or otherwise, as to make a captain doubtful about the land reported, it should be remembered that l'Ile de Groix, much smaller than Belle-Ile, has a square light-tower, not very high, built in the northern part, while that of Belle-Ile is circular, very lofty, and situated in the southern part. As for l'Ile d'Yeu, it is low, and the light-tower will at first seem to stand in the sea. Saint-Sauveur steeple will also be visible near it. Pilier light will be recognized by the structure, surmounted by a semaphore, to the southward of it.

If from haziness on the horizon neither Belle-Ile nor Pilier light-towers should be made, but a shorter and more massive one should be sighted ahead, appearing to stand in the water, that will be La Banche light, and the course should be changed to the southward for the mouth of the river.

But in case of thick weather, soundings would fix the position with fair accuracy. Thick weather

At 114 miles west of Belle-Ile is a depth of 93 fathoms, over sand and shells; at 95 miles, 82 fathoms; the sand is mixed with mud at 80 miles; and 44 miles off, pure mud will be found at 62 fathoms. Fifty-five fathoms is the depth 20 miles from the light. Soundings.

The approximate distance from Pilier light is obtained by simply adding 19 miles to the figures above, it being about that distance to the eastward of the line joining Belle-Ile and l'Ile d'Yeu.

When the depths become less than 55 fathoms, the lines of soundings cease to run parallel to the coast, but a knowledge of the following facts will prove useful.

In running to the eastward, should a vessel pass suddenly from rock bottom at $27\frac{1}{2}$ fathoms, to the same at 22 fathoms, the captain may feel pretty sure of being west of, and quite near, Belle-Ile. If this diminution of 5 fathoms in the soundings be only found in the course of 3 miles' run, and the bottom should first be gravel, changing to rock, the vessel

is 3 miles west of Ile d'Yeu. Finally, if the diminution of 5 fathoms be only found in the course of 10 miles, (east and west,) the vessel is on, or a little to the southward of, the parallel of La Banche light.

Should a captain be only certain of being between Belle-Ile and Ile d'Yeu, and find rock at $13\frac{1}{2}$ fathoms, without having made land, he may shape a course NNW. If it were the Guérande bank that he had found, that course would take him into Quiberon bay, where he could wait, in perfectly smooth water, for the fog to lift. If he had found the 13-fathom depth to the southward of La Banche, by steering NNW, he would soon see La Banche light, Gouëvas buoy, or the coast of Croisic, which, it will be remembered, is quite clear. Finally, if the ship should be in the channel between Ile d'Yeu and Les Bœufs, a NNW. course would bring her out clear of the chaussee.

Under these circumstances, however, if a heavy sea were running, it would be advisable to make an offing.

At night.

Approaching the coast at night it is only necessary to remember the different characters of the lights that are most likely to be made: that of Belle-Ile revolves every *minute*; that of Pilier is *fixed*, with a *flash* every 4 *minutes*; that of Ile d'Yeu is *fixed*. Le Four light, which revolves every one-half *minute*, could not be confounded with that of Belle-Ile, as the latter would always be made first. La Banche light is *fixed red*.

The position off the entrance being known, it lies with the captain to decide which channel to take, being influenced by the stage of the tide, and the directions of winds and currents.

Pilots.

The advice of the pilots deserves consideration also, as to which is the best channel to take. They sometimes lie in the port of l'Herbaudière during good weather, works having been carried on there to make it tenable. But they frequently cruise to windward. In bad weather they are most frequently to be found in the port of Arzie, near the point of that name, in the SE. part of Belle-Ile. The river pilots are often to be found cruising 10 miles to the westward of Le Four bank.

Directions for
the Grand Cha-
nel.

In fine weather, as soon as a vessel, coming from seaward with westerly winds, makes Belle-Ile, the ship's head should

be so laid as to pass 5 miles to the southward of it, and then S. 85° E., which will bring La Banche light off the port bow. Pass about three-fourths mile south of the latter, and on making Lambarde bell-buoy starboard the helm, pass 2 cables south of it, and head up to the ENE. to clear the buoy marking the wreck.* On reaching the alignment of l'Aiguillon and Le Commerce light-towers, the former should be kept open about 2° to the left of the latter, which places the latter over a point of rocks. To do this the course is N. 27° E. and leads over the Charpentiers bar in the deepest channel.

The outer edge of the bar is reached when the Pierre-Percée is open 1 point to the northward of the Grand Charpentier tower; and the bar is passed when the former comes in range beyond the Petit Charpentier tower. At that moment also l'Aiguillon and Le Commerce lights appear at the same height.

In case of a westerly swell heaving in, it would hardly be safe to pass so close to Guérande and La Banche banks. It would be better to steer S. 66° E. for Pilier light, with Belle-Ile light astern N. 66° W.† One advantage of commencing this course when near Belle-Ile is the facility of getting a pilot. The helm may be put a-starboard when La Banche light bears NE., steering N. 80° E. for 8½ miles. Then steer as directed above for Commerce light-tower open to the right of that of Aiguillon. Bad weather.

Under these circumstances a vessel would pass to the eastward of the buoy at the wreck east of Lambarde buoy. As the roughness of the water might very possibly prevent the buoy from being readily seen, the two lights should be kept well open for 3 miles after making the last change mentioned in the course. Then bring them about 2° apart again. N. 27° E. Caution.

On these courses the distance from Belle-Ile to the bar is about 37 miles.

Should the sea be so heavy as to make the bar impassable, which is seldom the case, and only during southwesterly

* This wreck will probably be removed before very long; the buoy will remain there until it is.

† When near Belle-Ile the light can only be seen from the rigging.

gales, a vessel should run under the lee of Noirmoutier island and anchor off La Chaise.

Coming from
southwest.

Vessels coming up from the SW., having made Ile d'Yeu, have only one danger to look for, and that is the Chaussée des Bœufs; they should steer when off that reef so as not to bring the Petite Foule light of Ile d'Yeu to bear south of S. 20° E. before Pilier light bears to the eastward of N. 70° E. When the latter bearing is passed the ship's head may be laid for Commerce and Aiguillon lights in line.

Chenal du
Nord.

The Chenal du Nord is the one generally taken by vessels beating in against northeasterly winds. To enter it pass Le Four light-tower to starboard, as also the buoy of Le Bonen du Four. The steeple of Bâts, S. 74° E., just outside and touching l'Autel, the outer rock of La Romaine, (the semaphore of the latter is a little to the southward of Croisie point,) leads through in deep water between l'Inconnu and Hikéric shoals. When 1½ miles from Le Four light on this course, port the helm to bring it to bear N. 65° W., about 2 miles off, and steer away from it S. 65° E. until abreast of the Grand Charpentier beacon, which must not be approached nearer than one-half mile.

Steamers.

In smooth weather, steamers coming in to the northward of Belle-Ile can steer a straight course, S. 69° E., for La Banche light, crossing Guérande bank. When Le Four tower bears NNE., starboard the helm and head east for about 8 miles, or until Gouëvas buoy bears N. 77° W., when steer away from it S. 77° E., with the Grand Charpentier beacon one-half point off the port bow.

Guérande steeple, over that of Bâts, N. 41° E., leads in between the shoals of l'Astrolabe and Michaud. The Château of Vautier, at Pornichet, bearing N. 72° E. over Leven islet (1½ miles to the southeastward of Pain Château point) leads in between the NW. rock of La Banche and the Basse Michaud. This latter range passes over the tail of Guérande with 6½ fathoms water. To the eastward of La Banche, Escoublac steeple N. 20° E. over Leven islet, leads in deep water, as does also Guérande steeple N. 7° W. over Pain Château point.

Finally, the Charpentiers bar may be approached with the Grand Charpentier tower N. 55° E. a little open of l'Eve point.

In beating through the northern channel, the Basse Lovre is avoided by keeping the mill of Poulhaut (1 mile north of Chémoulin point) open of Pain Châtean point, until Guérande is clear to the eastward of Bâts, when the boards may be continued closer inshore. Beating through the Ché-
nal du Nord.

In the anchorage NE. of Leven islet is a depth of $13\frac{3}{4}$ feet at low water. To make it, enter the Passe du Pain Châtean, steering for Escoublac steeple N. $38^{\circ} 30'$ E. The pass is 425 yards wide between Les Guérandaïses and Basse Martineau, with $3\frac{1}{4}$ fathoms water. Leave the course given when Bâts steeple comes over a little tumulus to the right of Pain Châtean battery, and steer away from it S. 70° E. until abreast of Leven islet. The anchorage is on the alignment of two mills to the left of Escoublac. Leven islet an-
chorage.

There are two channels leading from the bar to Saint-Nazaire. The more direct one is to the southward of the bank of Bonne Anse, and has $1\frac{1}{3}$ feet less water than there is on the bar. The other is the deeper and follows the curve of the north bank of the river. River.

Having crossed the Charpentiers bar, keeping Aiguillon light-tower open 2° to the left of that of Commerce, to enter the channel south of Bonne Anse bank port the helm as the lights of Saint-Nazaire and Ville-és-Martin draw near to each other, and steer for them in line, N. 53° E., until the beacon on the Petit Charpentier bank is just open of l'Eve point, then port again and steer N. 64° E., keeping the two latter in the same relative position, until the Tour du Commerce passes over Ville-és-Martin light-tower. The ship is then above the Morées bank and beacon. Then steer N. 50° E., with Saint-Nazaire light 1 point off the port bow, and come to in the roads before the latter comes in range with the steeple. Channel south
of Bonne Anse
bank.

A good channel, south of Bonne Anse bank, will be found also on the following ranges:

Leave the course that led over the bar as Saint-Nazaire and Ville-és-Martin lights come in line, but steer away N. 75° E. from l'Eve point on with Chémoulin point, keeping on this range astern until the Commerce light-tower passes to the eastward of La Rougeole rock of Bonne Anse, when steer so as to pass midway between the Morées tower and

Ville-és-Martin, making afterwards a N. 50° E. course to the roads.

Or in very clear weather still another set of ranges may be taken, using La Banche light-tower. When abreast the black buoy off l'Eve point, open Commerce and Aiguillon light-towers gradually, and finally steer N. 66° E. with La Banche light tower astern in line beyond l'Eve point; when abreast the Tour des Morées, follow directions above.

At night

At night, leave the approximate alignment of the Commerce and Aiguillon lights, that led in over the bar, before those of Saint Nazaire and Ville-és-Martin come in line, in order to make and keep the range of the two latter perfect. The minute La Banche light disappears behind the Pointe de l'Eve, steer N. 66° E., bring it in sight again with a spoke of the wheel, and remain just on the limit of its visibility, clear of that point. When past Ville-és-Martin light, steer up the river, with Saint-Nazaire light 1 point off the port bow, and anchor on the cross-bearings of the latter between the *red* and *green* lights at the entrance to the dock, and Ville-és-Martin light in line with that of Aiguillon beyond.

In case the night should not be clear enough to see La Banche light from the Pointe de l'Eve, (the distance being 9 miles and the range only 10 miles,) the alignment of Saint-Nazaire and Ville-és-Martin lights may be left, when the little *red* light on l'Eve point is slightly open to the southward of Aiguillon light, to steer N. 64° E., bringing the two latter gradually closer to each other. When l'Eve light disappears it will have been masked by the Tour d'Aiguillon, and it should be kept so, using starboard or port helm as the currents drift the vessel to the southward or northward of the range.

Anchorage.

In Saint-Nazaire roads is mud bottom at 9 fathoms.

Chenal de Bonne Anse

The Chenal de Bonne Anse follows the curve of the bight from which it takes its name, and has a least depth of $3\frac{1}{2}$ fathoms at low water. In one part of it there is anchoring ground.

Directions.

Leave the course over the bar before reaching the buoy off l'Eve point, and steer N. 36° E.; the Maison Neuve will be seen ahead on that bearing, and the middle of it should be kept over the gate in the wall surrounding it. When abreast of Trébezy inlet the signal staff on l'Eve point will

approach the dwelling of the Aiguillon light-keeper; steer N. 57° E. away from it as it touches the south angle, until abreast La Rougeole rock, when a course N. 83° E., with the house of Trébezy (on the N. shore of the inlet) to the northward of Les Rochelles mill astern, will lead in mid-channel between Ville-és-Martin and the Morées tower. After that, bring Saint Nazaire light 1 point off the port bow and keep on to the roads.

Vessels can also obey pilot-signals made at Pointe de l'Eve.

The range giving the outer edge of the bar (Pierre-Percée equidistant between the Grand and Petit Charpentiers towers) also passes over the banks on either side of the channel. When outside, before reaching the approximate alignment leading in, a vessel drawing 12 feet should not stand to the northward of Pierre-Percée two-fifths way from the former to the latter beacon. Beating up.

The channel is limited in the E. at first by the Banc de l'Est and afterward by the Banc de Bonne Anse, the former of which is marked by a red buoy on the NW. edge, and the latter by a red and black one also on the NW. edge. From the time of first reaching the bar until Pierre-Percée comes in range with the Petit Charpentier beacon, a vessel should tack when Saint Nazaire light bears midway between that of Ville-és-Martin and the Morées tower. After that the boards may be continued to the eastward to bring the little mill (1 mile north of l'Eve light) in line with the old guard-house of l'Eve, and finally the red buoy of the bank in line with La Rougeole rock. Limit of boards to the eastward.

Until the Pierre-Percée passes to the northward of the beacon on the Petit Charpentier, a vessel should not go to the westward of the alignment of the Tour du Commerce and Aiguillon point. After that she may stand farther to the westward, but keep Pornichet to the northward of Chémoulin point; finally the range of Saint-Nazaire and Ville-és-Martin light-towers is the limit. Twelve feet may be carried to 55 yards of l'Eve buoy, (black.) Limit of boards to the westward.

The above limits are to be observed at low-water springs. At other stages of the tide the boards may be made farther to both eastward and westward.

The anchorage in the bight called Bonne Anse is good in all weathers, the banks that lie between the channel and Anchorage in Bonne Anse.

the sea breaking the sea and giving good shelter to vessels. The bearings used by the pilots are the signal-mast of l'Eve point touching the north edge of l'Aiguillon light-keeper's dwelling, or the house of Les Rochelles open to the southward of Trébezy house, and the Tour du Commerce between La Rougeole rock and the western point of La Rougeole bay.

On the former up-and-down stream range the greatest depths are down stream.

Saint - Nazaire
roads.

In the roads off Saint-Nazaire, $5\frac{1}{2}$ -fathom depths are limited in the north by Saint-Nazaire light touching the north side of the church of that town; in the west they are found to within 115 yards of the black tower of Les Vignettes; in the east they are limited by the range of the white buoy and Morées tower.

Only the eastern part of the anchorage is really snug; near Les Vignettes, and off the end of the jetty, the current of the ebb is so strong that the anchors would not hold. The best cross-bearings for coming-to are Ville-és-Martin and Aiguillon lights in line, and Saint-Nazaire light in the middle of the Grande Rue.

A little above that the plateau of Saint-Nazaire divides the anchorage into two parts, one of which in the west joins the *fosse* of Méans, and the other the channel of Mindin. Ville-és-Martin light inside (to the northward) that of Saint-Nazaire, is the range for the former, in which are depths of $6\frac{1}{2}$ fathoms, at low water, abreast the entrance to the dock, decreasing to the northward. For the eastern part, a good range is the south point of Ile Saint-Nicolas well open to the northward of Mindin mill, or the white buoy of the anchorage under Ville-és-Martin light. The anchorage is good at all times except during the breaking up of the ice. As a general rule, however, it is only used temporarily, the operations of loading and unloading being carried on in the dock.

Basse de Saint-
Nazaire.

The Basse de Saint-Nazaire is a plateau with three principal heads, covered respectively by $6\frac{1}{2}$, $9\frac{3}{4}$, and $10\frac{3}{4}$ feet of water. The northernmost rock is marked by a buoy, but the southern is not, and but for the general smoothness of the river, many vessels that have struck there would have gone to pieces. Saint-Nazaire light in the middle of the Grande

Rue, near the church steeple, gives $11\frac{3}{4}$ feet, and, in line with the latter, 23 feet.

The flood-tide is apt to set vessels on this shoal.

Caution.

The wet-dock, which is solidly executed in granite, has two locks, the northernmost of which is the larger, being 82 feet wide, with a floor 11 feet below the level of the lowest spring ebb-tides. The smaller is $42\frac{1}{2}$ feet wide, 197 feet long, and has a sill $7\frac{1}{10}$ feet below spring ebbs. It may be entered from half-flood to half-ebb.

Wet-dock.

Signals are made at the entrance after half tide, indicating the height of water above the zero of the scale of the entrance, which corresponds to the sill of the smaller lock.

Dock-signals.

The following signals are also made from a flag-staff near the south lock:

A white flag, quartered with black, under a black pennant: sluices are open to the flood.

The same flag under the national ensign: the large lock is open.

The same flag alone: the smaller lock is open.

The same flag over a black pennant: sluices are open to the ebb in the smaller lock.

A red flag means that the channel is closed; entrance is forbidden.

A blue flag means that water is to be run from the locks.

The small gates to the basin are opened three-fourths of an hour before high water and closed at the commencement of the ebb. In bad weather the gates to the basin are never opened, nor between sunset and sunrise in any weather, unless in special cases.

A vessel preparing to enter should hoist her national flag above the private signal, and have a kedge ready to let go aft, as well as good hawsers ready to send to the piers.

It is best to come off the entrance to the basin a little before high water, as the flood-tide will facilitate hauling in. Steer W. or NW., according to the strength of the tide, to pass inshore of the Basse de Saint-Nazaire, and haul to the southern quay.

Directions.

If the ebb-tide have commenced there will be found an eddy inshore, which would probably catch the bows and sheer the vessel over to the north quay unless the precaution had been taken of sending lines to the southern quay.

Caution.

When the ocean-steamers are about to go in or out, the red flag is hoisted at the signal-staff, and no other vessel is allowed between the quays.

Steamers must stop their engines in time to have their way completely checked before approaching the locks. The officer of the port decides whether they may go through under steam or be hauled through.

There are no dock-dues.

Town of Saint-Nazaire.

The town of Saint-Nazaire is of but little importance save as the outport of Nantes. But the construction of the wet dock, and the establishment of a line of steamers to different ports in the West Indies, Central America, and the Pacific, have given an impetus to foreign trade, and as a spirit of improvement is manifest everywhere, it may become a considerable commercial port. The greater number of the river-pilots live in the town.

Population.

The population of Saint-Nazaire is about 10,000.

Imports.

The principal imports are coal, iron, machinery, guano, raw sugars, coffee, &c.

Exports.

The exports consist principally of cereals, fish, pitwood, refined sugars, and mules.

Vessels frequently leave in ballast.

Charges.

The pilot-charges for shifting anchorage in outer roadstead, or entering or leaving the docks, are :

	Francs.
Vessels from 151 to 300 tons.....	15
Vessels from 301 to 450 tons.....	20
Vessels from 451 to 600 tons.....	25
Vessels from 601 to 750 tons.....	30
Vessels from 751 to 900 tons.....	35

Vessels chartered for Nantes can discharge sufficient cargo at Saint-Nazaire to enable them to reach the former port, but this is done at the ship's expense. The cost of lighterage of cargo up to Nantes is usually about 3 francs per ton.

Ships arriving from any European port pay a brokerage of 50 centimes per ton of cargo ; 12 francs for entry at the custom-house. Vessels from any port out of Europe pay 75 centimes per ton brokerage, and 18 francs entry at the custom-house. Steamers pay half-pilotage from the sea, but whole pilotage for the dock, about 20 francs.

Masters are obliged to report their vessels at the sanitary office on the pier-head before they can enter the dock. Any vessel leaving the dock by night has to pay 50 francs.

All vessels requiring a fire on board have to employ a fire-guard, at 3 francs per day.

Brokerage and disbursements of a British bark of 347 tons register, from Havana, with a cargo of sugar, and bound to England in ballast: Example of a vessel's expenses.

	Francs.	Centimes.
Pilotage from Belle-Ile to Saint-Nazaire.....	145	30
Towage from Charpentiers to Saint-Nazaire.....	300	00
Quarantine-fees	114	50
Surveyor's fees.....	48	50
Consul's fees.....	6	25
Entry of the vessel at the custom-house.....	18	00
Report made to the custom-house	6	00
Protest noted to the Tribunal of Commerce.....	28	90
Request to the tribunal of commerce for appointing surveyors	8	00
Pilotage from the roads into the dock	20	00
Inward brokerage on 390 tons for Saint-Nazaire, at 75 c. per ton.....	292	50
Clearance of the vessel at custom-house	12	00
Boat and men for towing vessel into dock.....	10	00
Tow-line dues in, 3 c. per ton.....	10	44
Tow-line dues out, 2 c. per ton.....	6	96
Pilotage from dock to roads.....	20	00
Manifest out.....	1	00
Ballast, 100 tons sand, at 1 fr. 50 c. per ton	150	00
Guard, 20 days, at 3 fr. per day.....	60	00
Pilotage out from Saint-Nazaire to Pilier.....	33	60
	<hr/>	<hr/>
	1,291	95

The town of Paimbœuf is on the left bank of the Loire, 7 miles above Saint-Nazaire. It is no longer of any commercial importance, even the local trade being insufficient to make the place prosper. The exportation of mules was formerly concentrated here, but is now carried on from Saint-Nazaire. About the only import is timber. Paimbœuf.

River-steamers plying between Nantes, Donges, and Saint-Nazaire stop here several times daily.

Water can be obtained from the wells on shore, but it is not very good, and it is better to buy it from the tanks that come down from the upper part of the river.

Population.

The population of Paimbœuf is about 3,600, but emigration has commenced to Saint-Nazaire.

Ships proceeding to this port have to clear in and out at Nantes also; and if they employ brokers at each place, the one in Nantes receives two-thirds and the one in Paimbœuf one-third.

Charges.

The total charges on a bark of 380 tons register, cargo in, ballast out, drawing 15 feet loaded, are about 1,312 francs.

It is almost impossible to navigate as far as Paimboeuf without a pilot, as the channel is intricate and changes from year to year.

Anchorage.

There is good anchorage both above and below the town.

The anchoring-ground below the town commences at Pierre-à-l'Oeil tower, (from which it is proposed to exhibit a light,) and extends to abreast of the light on the jetty, near which it branches off toward the middle of the river. Good ranges for coming-to are Pierre-à-l'Oeil tower, on with the Maison Perret, or Paimbœuf light in line with the lower end of Carnay island, and the tower of Les Brillantes open one-half point to the left of Donges. If a berth be desired nearer the jetty, make the first of these alignments, and for a cross-bearing bring the light in line with the jetty, on with the house at the inshore end.

The least depth in this anchorage is $14\frac{3}{4}$ feet below the level of low-water springs at Saint-Nazaire, but, because of the descent of the river between the two places, there is never less than $17\frac{1}{3}$ feet water, there being that much difference in the low-water levels.

In the anchorage above Paimbœuf, which is generally called that of the Quatre Amarres, is also a depth of $17\frac{1}{3}$ feet. Vessels generally moor there head and stern. The ebb-tide runs 5 and 6 knots at springs.

Gridiron.

Paimbœuf has a tidal basin with a gridiron, the blocks of which are $1\frac{3}{4}$ feet above low-water level. Therefore, vessels drawing 16 feet can only be taken at high-water springs. Two buoys have been planted outside to run lines to.

Nantes.

Nantes is situated on the right bank of the Loire, 28 miles above Saint-Nazaire. It is the capital of the department of Loire Inférieure, and is a large and important commercial

city, ranking in importance as the fourth port of the republic, notwithstanding the difficulties attendant upon the navigation of the river. It stands partly on the main-land intersected by the Erdre and Sèvre-Nantaise rivers, and partly on three islands formed by the irregular course of the Loire. Thus situated, it enjoys the advantages of water-communication between its various parts. The old part of the town is on the slopes and summit of a gentle hill, half encircled by the Loire. The handsomest quarters are on the islands Gloriette and Feydau, which are connected with the main and each other by numerous bridges, several of which are very handsome, the Pont de Pirmil being 277 yards long, with 16 arches. There are also two railway bridges over the Loire.

Both the river-bank and shores of the islands are bordered by fine quays, one of which, the Quai de la Fosse, over a mile and a half in length, is broad and shaded by fine elms, and bordered by balconied terraces and warehouses. The quays Des Braces and Port Maillard are also planted with trees, being at once well frequented promenades and the principal seats of commercial activity. The whole city is in general regularly laid out, and well built and paved. Most of the houses are of stone, roofed with slate. There are between 30 and 40 squares, the principal of which, the Place Royale, is surrounded by handsome shops. This and the *quartiers* Graslin and Feydau may be compared with the best parts of Paris.

Nantes was formerly fortified, but its ramparts have been mostly demolished, and it is now an open town communicating with four considerable suburbs. In the east part of the city, skirting the river, is the large and imposing castle of the ancient dukes of Brittany, a mass of irregular buildings surrounded with thick walls flanked by solid round towers. It is now in a great measure dismantled, and is the residence of the military governor, and a powder-magazine. The finest building in the city is the Prefecture. It was erected between 1750 and 1777, and was formerly appropriated to the Cour des Comptes. It has two noble fronts of the Ionic order, a fine staircase, and several large halls and other good apartments; it is partly used as the depository of the departmental archives. The cathedral,

not imposing either without or within, has a front, ornamented with good though mutilated sculptures, and flanked with two towers 170 feet high; in its interior is a magnificent marble tomb erected by Anne of Brittany in memory of her father, Francis II, the last duke of that province. No other church demands particular attention. Among other noticeable buildings are the exchange, the theatre, the town hall, and the Palais de Justice; the Hôtel Dieu, on Ile Gloriette, with 670 beds; the Hospice du Sanitat, or general infirmary and asylum, with 800 beds; the Hospital of Incurables; the museum, which contains more than 1,000 paintings and 300 sculptures; the Salorges, a general depot for merchandise; and the public library, with 30,000 volumes.

Population.

The population of Nantes was 118,500 in 1872.

Industries.

The manufactures of the city are various and on the increase. Coarse woolen cloths and flannels, cambrics, printed cotton goods, handkerchiefs, tickings, and hosiery are made on a large scale, besides which there are biscuit-making houses, chemical works, potteries, rope-walks, copper foundries, manufactories of cannon and iron cables, and other stores, with breweries, distilleries, sugar-houses, tan-yards, vinegar establishments, and ship-yards for building merchant-vessels and occasionally small corvettes.* The pilchard fishery is carried on with great activity, employing in the season 700 boats, manned by 3,000 seamen.

The high prices of English coals have caused a considerable development of severable mines in the country, where large quantities of patent fuel are made for the railroad companies. There are also large quantities of manures manufactured, principally from spent charcoal and peat-mould from the large bog of Montoir, near Saint-Nazaire.

Commerce.

Nantes was formerly famous for her quick-sailing vessels, but such is no longer the case. At Indret, on an island a little below the city, is an establishment for building steamships, which, in 1865, employed 2,000 workmen. Previous to the revolution, the foreign trade was much greater than it is at present, and during the time that the slave-trade

* There was a marked decline in ship-building a few years ago, probably attributable to a restrictive law passed in May, 1866. An attempt was made in 1872 to stimulate it, by imposing heavy duties on imported foreign-built vessels. *I*vide Appendix.

was carried on, Nantes was more extensively engaged in it than any other French port. Now, Marseilles, Havre, and Bordeaux rank above her as commercial cities; but she is still the emporium of all the rich, extensive country traversed by the Loire, and has a considerable trade, both of exports and imports, particularly with the French West Indies and the different ports of Europe.

The trade of the place has been reviving lately; between the years 1865 and 1871, the annual custom house receipts increased from 21,976,985 francs to 30,749,517 francs. Several new lines of railways authorized by the late imperial government, from La Vendée, Brittany, and Normandy, to this port, have been commenced, and will give a further impetus to the trade of the district.

During the year ending September 30, 1874, there was a remarkable falling off in the trade with the United States, the decrease in the value of exports as compared with the previous year being \$67,500.

The exports comprise all sorts of French produce, but principally wine, brandy and vinegar, silk, woolen and linen goods, refined sugar, wheat, rye, and ship's biscuits. Exports

The imports are raw sugar, coffee, and other colonial produce, cotton, indigo, timber, and hemp. Imports.

Nantes is likewise a considerable entrepôt for the salt manufactured at Noirmoutier and Croisie.

Here, as in all other French ports, all vessels above eighty tons burden are bound to take a pilot whenever they move any distance above a cable's length. Pilot regulations.

Ships lying at anchor must ask for a pilot at the nearest station. The pilot-stations are Belle-Ile, Croisie, Saint-Nazaire, Paimbœuf, Basse-Indre, and Nantes.

Captains are bound to take the first pilot they meet, and must put down in the book of which each pilot is the bearer the name of the place where the vessel was taken or left by him.

Pilots employed at any work other than pilotage are paid six francs per day. Each day begun is due.

Brokers and consignees of foreign ships are responsible for the payment of pilotage in and out.

The tariff for change of position at Nantes and other ports on the Loire is as follows:

	Other ports. Francs.	Nantes Francs
Vessels of 150 tons and below	10	6
Vessels of 151 to 300 tons	15	9
Vessels of 301 to 450 tons	20	12
Vessels of 451 to 600 tons	25	15
Vessels of 601 to 750 tons	30	18
Vessels of 751 to 900 tons	35	21
Vessels of 900 tons and above		24
And so on, increasing 5 francs for every 150 tons.		

Every pilot, belonging to Belle-Ile, l'Herbaudière, Croisic, and Pouliguen, who takes a vessel to Saint-Nazaire, has a right to the following payments :

	Francs.
Belle-Ile pilot	10
Herbaudière pilot	9
Croisic and Pouliguen pilot	3

And reciprocally, pilots who may pilot a vessel from Saint-Nazaire and be landed at any of these places.

The Belle-Ile pilots are paid by the pilot-office, the others by the ship.

Towage, if required, 1 franc per ton on cargo of coals inward.

Total charges on a schooner of 144 tons register: inward, with a cargo of 243 tons coals; outward, in ballast; draught of water in, 12 feet; out, 7 feet; 520 francs.

Le Croisic
roads.

North 7° W., $4\frac{5}{6}$ miles from Le Croisic point, is the Pointe du Castelli; between the two is a bay bordered by a sandy beach, back of which the land is low, with occasional sand-downs. The bay extends in 2 miles from the lines between the two points, and forms the roadstead of Le Croisic, with depths of 5 to 7 fathoms at $1\frac{1}{2}$ miles from the middle of the beach, over sticky mud, sand, and broken shells. With winds between east and south, neap-ebb tides do not turn throughout the day, and beating in is, consequently, very tedious work.

Port of Le
Croisic.

In the SE. corner of this bay is the little port of Le Croisic, which dries at low water. The entrance is very difficult because of the numerous shoals, and because the tidal currents run very strong.

Tidal signals.
Town.

Tide-signals are made from the heights of Enigo.
The population of the town is about 3,000, but during the bathing season many strangers flock there, a road con-

necting it with Guérande. There are about 80 boats employed in the fisheries, and considerable salt is sent to Nantes for exportation.

From Castelli point the coast, in general low, trends to the northeastward for 5 miles, and, making an elbow, in which are two little bays, the Port du Mesquer and the Trait de Penbaie, which dry at low water, runs 4 miles in a general direction of NNW. to the Pointe du Halguen, which is some 50 feet high, and forms the southern point of entrance to the Vilaine river. Coast.

Off Castelli point, on which is a signal-station, a rocky bank, called the Plateau du Piriac, extends about 2 miles, between NNW. and NW. by W. On it are several shoals, covered by $5\frac{1}{2}$ to $6\frac{1}{2}$ feet of water, and rocks, that uncover at low water, project one-half mile out, one of which, Les Bayonelles, one-half mile west of the point, is marked by a tower. Plateau du Piriac.

Commencing at 1 mile to the northwestward of the Plateau du Piriac is another rocky shelf, on which is l'Ile Dumet. This latter plateau is $2\frac{1}{2}$ miles long ENE. and WSW., with a width not exceeding $1\frac{1}{2}$ miles. The island affords a lee to small coasters, who have ridden out quite heavy gales of wind there. The shoals are at depths of $3\frac{1}{4}$ to $9\frac{3}{4}$ feet. Ile Dumet.

Between the plateaux of Dumet and Piriac is a pass with $5\frac{1}{2}$ fathoms at low water. The limit of the channel on the south side is on the range of Pont-Mahé mill over the guard-house on the Pointe du Bile NE. by E. $\frac{1}{4}$ E.; in the north the limit is the same mill over the southern point of Bile island. Outside of these limits the plateaux break in bad weather, and in very heavy weather the breakers reach out even to mid-channel; but vessels can always use the pass. The ebb-tide runs $4\frac{1}{2}$ knots, at springs, to the southwestward. Passage of Ile Dumet.

Among other spots to be avoided by vessels beating along the coast are the Roche de Kervairé, one-half mile off shore, $2\frac{1}{4}$ miles to the northeastward of Castelli point; the Basse de Beaulieu, 2 miles to the northeastward of the latter shoal; the Basse du Bile, to the westward of the Trait de Penbaie, and others, none of which are particularly dangerous, being in rather shoal water where vessels would not be apt to come. Other dangers.

Penlan point. At a little over 1 mile N. $\frac{1}{4}$ W. from Halguen point is Penlan point, the northern extreme of the mouth of the Vilaine river.

Light: Lat. $47^{\circ} 31' 00''$ N.; long. $2^{\circ} 30' 14''$ W. On the reddish cliffs of Penlan point is a round tower 31 feet high, with dwelling attached, from which is exhibited, at an elevation of 52 feet above sea-level, a *fixed white*, dioptric, fourth-order light, visible 10 miles.

River Vilaine. The Vilaine river rises in the department of Mayenne, not far from Vitré, and has a total length of about 135 miles. Its course is at first westerly, running to the southwestward after passing Rennes. Among other towns on its banks are Redon and La Roche Bernard. It is navigable by small vessels 90 miles.*

Coast. From Penlan point, the coast, which is moderately high, very much cut up by small bays and coves and skirted in many places by rocky ledges and shoals extending $1\frac{1}{2}$ miles out, runs 12 miles W. $\frac{3}{4}$ S. to the Pointe de Saint-Jacques, which is the NW. extremity of the opening of the Vilaine, the SE. extremity being Castelli point.

Kervoyal point and shoal. At 2 miles W. by S. from Penlan point, terminating a tolerably deep indentation in the coast, is Kervoyal point, off which is a reef of the same name marked by a beacon.

Penvins point. About midway between the latter and Saint-Jacques point is the Pointe de Penvins, off which rocks extend in all directions. It is crowned by a battery, and to the eastward of it is the entrance to the Port Penerf, a broad inlet, on the eastern shore of which, 2 miles from the mouth, is the town of that name.

Plateau des Mâts. Off this inlet, and extending some distance to the eastward, is the Plateau des Mâts, the outer edge of which, including the Basse des Mâts, is nearly 2 miles from the coast. Over the latter rock is a depth of 6 feet.

Landmarks. The landmarks used on this portion of the coast are the Penlan light-tower; the dome of the old abbey of Prières, three-fourths mile to the northeastward of the latter; Penerf steeple, which is very sharp and roofed with slate; the steeple of La Tour du Parc, very lofty, and distinguishable by a clock at the bottom of the spire; the Tour de Penerf, built on the low shore and resembling an old-fashioned light-house; the tower of Le Pignon, the guard-house of

* For directions and description of towns, &c., *vide* pages 345 to 349.

Penvins, the Château of Succinio; the little black tower on the Chaussée de Bauzec, at the foot of the cliffs S. of the Pointe du Grand Mont, and the church of Saint-Gildas, on the summit of Le Grand Mont, whose tower, being square, is readily distinguishable. In addition to these, mills are used in ranges.

The inlet of Penerf is quite broad and shallow, with exception of the channel, 5 to $6\frac{1}{2}$ fathoms deep, with a bar covered by $3\frac{1}{4}$ fathoms. Port Penerf.

Vessels sometimes anchor in Penerf roadstead to await a favorable opportunity to enter the Vilaine river. It possesses the advantage of good holding-ground, but that is all, as vessels lying there are fully exposed to the SW. winds. Depths of $3\frac{3}{4}$ fathoms are found with Penerf steeple over the little tower of Penerf, and the guard-house of Penvins in line with the castle of Succinio. With appearance of bad southwesterly weather it would be better to come to in $4\frac{1}{2}$ fathoms, with the little tower in line with the new mill of Le Parc, and the other range the same. From here it would be easier to get under way to make the Vilaine. Roadstead.

Vessels also anchor temporarily in $3\frac{3}{4}$ fathoms off the entrance to the passes of the inlet, with the little tower of Penerf on with the steeple, and the red buoy of Borénis, which marks the SW. edge of the Plateau des Mâts, in line with Halguen point. The bottom here is mud and clay.

A small tower is being built on Le Borénis rock, (near the SW. edge of the Plateau des Mâts,) and will give good ranges for avoiding the plateaux of Penvins and Les Mâts. To avoid the former, bring this tower in line with Penlan point, (N. side of the mouth of the Vilaine;) to avoid the latter, keep it to the northward of Succinio castle. Beacon.

There are three passes leading into the Port Penerf: the Passe du Centre, the Passe de l'Est, and the Passe de l'Ouest.

The first, although only 1 foot deep at low water in one place, has heretofore been used most, simply because of the channel being more easily followed than the others. Passe du Centre.

The eastern pass has been made practicable by the placing of a beacon and a buoy on and off the salient angle in the channel, in which the least depth is 13 feet at low water. Passe de l'Est.

Coming from the offing, bring that beacon in line with a slender tree to the right of the steeple of Le Tour du Parc Directions.

and pass 11 yards from the former, rounding it and steering for the tower of Le Pignon, avoiding the N. side of the channel, marked by a small red beacon. When about 45 yards from the latter, head N. $\frac{1}{2}$ W., passing it to starboard, and passing also quite close to the red tower of Petite Bayonnette, and two red beacons on the starboard and a black buoy on the port side. In this part the channel is 5 to 6 fathoms deep and the shores steep-to. When the last red beacon S. of Penerf church has been passed, port the helm and steer for the beacon on the end of Penerf jetty, N. 63° E., in line with the middle of the trees of Larmor. This course leads to the anchorage, and vessels may come to anywhere from the range of Penerf tower on with the Pointe du Sable to abreast the village. The depths vary from $9\frac{3}{4}$ to $16\frac{1}{2}$ feet at low water. Sand and mud bottom.

Caution.

Vessels must guard against the set of the 3-knot current, which runs over the rocks at the bend of the channel as soon as they are covered to a depth of 3 feet.

Passe de l'Ouest.

The western pass does not deserve special notice, as there is a spot on it of only 1 foot depth.

Tides.

It is high water 10 minutes before Saint-Nazaire, the time at full and change being $3^h 30^m$.

Currents in the offing.

The tidal currents in the offing rarely exceed $1\frac{1}{2}$ knots in strength, and flow to every point of the compass, turning in the opposite direction to that of the hands of a watch. Near the entrance to the inlet the flood sets north; but a little to the eastward, off the Plateau des Mâts, the Vilaine influences it, drawing it to the northeastward.

Anse de Succinio.

West of the Pointe de Penvins is an open roadstead, called l'Anse de Succinio. The ranges for anchoring are Penerf tower in line with Penvins guard-house, and Le Roh Béniguet, a rocky ledge protruding 23 feet above low water, and limiting the anchorage in the west, open a little to the northward of Saint-Jacques chapel, and the château of Succinio bearing due north.

Pointe du Grand Mont.

On the coast between Saint-Jacques point and the Pointe du Grand Mont, the cliffs rise perpendicularly near the water, while farther to the eastward they recede somewhat from the coast. The latter point is a little over $2\frac{1}{2}$ miles WNW. from the former, and off it is a plateau of the same name, a continuation in the westward of that of Saint-

Jacques. The $5\frac{1}{2}$ -fathom line ranges from $1\frac{1}{4}$ to two miles from the coast.

A rocky ledge, called the Basse de Bauzec, projects from the base of the cliffs, about 1 mile to the westward of Saint-Jacques point, and is marked by a little black tower at its extremity. To the westward of the latter, three-fourths mile off shore, is the Basse du Grand Mont, which is buoyed on the southern edge.

All along here the coast is quite high, the Petit Mont being an excellent landmark. The trend is to the northwestward, then west, south and SE., inclosing Quiberon bay. All this coast is extensively and deeply indented by numerous little bays that dry at low water, and in the NE. corner is the estuary called Le Morbihan, which in the Breton dialect means the Inland sea.

Quiberon bay is $15\frac{1}{2}$ miles deep, to the northwestward from the line between the shoals off Haedik island and Saint-Jacques point. The entrance is $9\frac{1}{2}$ miles wide, though the working-room is greatly reduced by the Plateau de la Recherche and other banks. The anchorage in the bay is good in all weathers, the bottom being sand and mud at 5 to 12 fathoms, and the peninsula from which it takes its name, together with the islands and shoals to the southeastward of it, affording a lee from all winds. There is high land on both shores.

At Port Navalo, the SE. point of entrance to Le Morbihan, is a *fixed white*, dioptric, fourth-order light, visible 10 miles, exhibited, at an elevation of 72 feet above sea-level, from a circular tower 33 feet high, with keeper's dwelling attached. It lights the whole horizon except a sector toward the interior of Le Morbihan, and has extra brilliancy when seen in the NE., being visible 15 miles when on that bearing.

On the left side of the mouth of the Crac'h river, which falls into the head of the bay, is a *fixed red*, catoptric, fourth-order light, 30 feet above sea-level, visible 9 miles, exhibited from a house 17 feet high, painted white. N. by W., 574 yards from it, is a white, round tower, 41 feet high, exhibiting, at an elevation of 69 feet above sea-level, a *fixed white*, dioptric, fourth-order light, visible 10 miles. The two

Basse de Bauzec.

Coast.

Quiberon bay.

Navalo light:
Lat. $47^{\circ} 32' 54''$ N.; long. $2^{\circ} 55' 14''$ W.

Crac'h lights:
Lat. $47^{\circ} 34' 07''$ N.; long. $3^{\circ} 00' 29''$ W.

in line lead into Crac'h river. The *red* one is only visible through 15° on each side of the line of direction.

Peninsula of
Quiberon.

The peninsula of Quiberon is 5 miles in length NNW. and SSE., with a greatest width of two miles. It is quite high, and is connected with the main-land by an isthmus not more than 100 yards wide. The SE. extremity is the Pointe de Conguel.

Port-Haliguen
light: Lat. $47^{\circ} 29'$
 $10''$ N.; long. 3°
 $06' 15''$ W.

On the north jetty at Port-Haliguen, on the east coast of the peninsula, is a *fixed white*, dioptric, fourth-order light, visible 10 miles, exhibited at an elevation of 39 feet above

Life-saving
station.

sea-level, from a circular tower 37 feet high. A life-saving station has been established here.

Banc de Qui-
beron.

At a distance of 2 miles to the eastward of the southern portion of the peninsula, is the Banc de Quiberon, which is $1\frac{1}{2}$ miles long north and south, one-third mile wide, with depths varying from 1 fathom near the southern end to $5\frac{1}{2}$ fathoms near the north extremity. The bottom is sand. A black and red buoy marks the southern edge.

To the southward and eastward of the southern extremity of the peninsula, project a number of rocks, many of which are below low-water level. Some, however, are quite prominent.

La Teignouse
light: Lat. $47^{\circ} 27'$
 $28''$ N.; long. 3°
 $02' 52''$ W.

The principal and easternmost of these is La Teignouse rock, which is large, high, and round, and distinguished by a circular tower 51 feet high, with enlarged base, on its summit showing a *white* light, *fixed*, with a *flash* every 3 minutes. The light is dioptric, of the third order, elevated 59 feet above sea-level, visible 11 miles. In line with Navalo light, it leads into the west entrance of La Teignouse pass.

Fog-bell.

During fogs a bell is sounded continuously, 1 stroke every 2 seconds.

Rocket-appa-
ratus.
Basse Neuve.

A rocket-apparatus has been established on La Teignouse. At a distance of one-half mile SE. from the light is the Basse Neuve, with 6 feet of water. It is marked by a buoy.

Basse du Che-
nal.

The southernmost of the rocks, on the plateau immediately off the south point of the peninsula, is the Basse du Chenal, $2\frac{1}{2}$ miles WSW. $\frac{1}{4}$ W. from La Teignouse light. It is also marked by a buoy.

Gouëvas.

South-southeast, three-fourths of a mile from the latter, is a patch, called the Gouëvas, with 4 shoal spots. There

is a red buoy indicating the northern edge, and a black and red one on the southern.

The first of the chain of islands and plateaux, extending ^{Chaussée du Beniguet.} southeastward from Quiberon, is the Chaussée du Beniguet, the NW. extreme of which is $2\frac{1}{3}$ miles, SSE. $\frac{1}{2}$ E., from the peninsula, leaving a passage, $1\frac{1}{4}$ miles wide, to the northwestward of it. Among the rocks in the northern part are Les Esclassiers, on one of which is a small red tower or beacon. On the SE. point is also a tower, built on Le Grand Coin. The latter is black.

Between the Chaussée and Houat island, to the southeastward, is the Passage du Beniguet.

Houat island is of irregular shape, $2\frac{1}{2}$ miles long NW. ^{Houat island.} and SE., and three-fourths of a mile wide in the southern part. It lies on a plateau, the NE. part of which is called the Banc de Houat, and the southern the Chaussée de l'Ile aux Chevaux. The island is inhabited entirely by seamen, the principal occupation being fishing.

Off the NW. point of the island are the Grande and ^{Shoals.} Petite Basses de Houat, the latter of which is a little over 1 mile N. by E. from the point. To the westward are the Men-er-Broc, Bonen-Bras, Ile Guric, and the Grand Rouleau. The second and last of these have a red tower built upon them.

Houat bank extends to the northward and $2\frac{3}{4}$ miles to the ^{Banc de Houat.} eastward of Pointe-er-Genelen, and has many shoal patches. On Men-er-Houtelignet, one-half mile eastward of the SE. end, is a stone tower, surmounted by a wooden beacon, painted in alternate bands of black and red. On Er-Spernec-Bras, 1 mile to the southeastward of the latter, is a black tower, surmounted by an iron staff. Men Groïse, three-fourths of a mile N. by E. from the latter, is marked by a black and red tower.

The Chaussée de l'Ile aux Chevaux lies to the southward ^{Chaussée de l'Ile aux Chevaux.} of Houat island, the southern edge being $2\frac{1}{4}$ miles off. There are depths of 6 fathoms on it, but on the southern border are a line of rocks, some of which are marked by beacons. The westernmost of these is the Basse Occidentale, the top of which, under 16 feet of water, is given by the red tower, on Rouleau rock, just open to the westward of that on Bonen-Bras beyond; by the summit of Petit

Mont (on the main-land) between Rouleau rock and Men-er-Broc; and by the Grimaud rocks outside l'Ile aux Cheveaux.

Passage des
Sœurs.

There is a passage, that of Les Sœurs, to the southeastward of Houat island and bank, between them and Haedik island.

Haedik island.

Haedik island, 3 miles SE. from Houat island, is situated on a plateau which includes many rocks and shoals, mostly in the southeastward and eastward, which terminate the SW. border of Quiberon bay. The most easterly of these are Les Grands Cardinaux, the outer one of which is a little over 2 miles to the southeastward of the shore of the island. To the northward and westward of them are Les Petits Cardinaux. Separate from the plateau, $2\frac{1}{6}$ miles SE. $\frac{1}{2}$ S. from the island, is the Basse des Cardinaux, a rock covered by 18 feet of water, the depths all round it being 10 and 12 fathoms. Along the south edge of the plateau are a line of shoals, the farthest of which are $1\frac{1}{2}$ miles south of the island, called the Basses du Chariot; the SW. one is marked by a buoy.

The easternmost shoal is Cohfournik marked by a black tower.

Off the NW. point of Haedik island, extending nearly 1 mile to the westward, are groups of rocks, of which the principal are Les Sœurs, Coh Karek, Baseu Très, Er Palaire, (the southwesternmost,) and Er-Vas-Plate-à-Vore.

Haedik light:
Lat. $47^{\circ} 20' 36''$
N.; long. $2^{\circ} 52' 11''$ W.

On Haedik island, 601 yards west from the east point, is a square tower 39 feet high, attached to a building, showing a *fixed white*, dioptric, fourth-order light, visible 10 miles, elevated 85 feet above sea-level.

Signal-station.

There is also a signal-station on the island, with yellow house.

Plateau de la
Recherche.

Running parallel to the main coast, near Pointe de Saint-Jacques, and distant 3 miles from it, is a long, narrow bank, called the Plateau de la Recherche. It is $4\frac{3}{4}$ miles in length E. by N. and W. by S., of a width varying from one-sixth of a mile near the middle to three-fourths of a mile at each end, with depths of 3 to $7\frac{1}{2}$ fathoms, excepting in a few places where rocky bottom is found at 1 fathom.

On the western end of the plateau, bearing S. 27° E. from Lomariaker steeple, is a shoal covered by $4\frac{1}{4}$ fathoms. About

1 $\frac{5}{6}$ miles E. by N. from it, near the middle of the bank, is the Roche de Lomariaker, with only 1 fathom over it; its bearings are Lomariaker church N. 36° W., over Port Navalo point, and the south point of Dumet islet, S. 80° E., in line with the southern part of Beaulieu woods. Finally, one of the heads of the Roche de Sarzeau, with 7 feet on it at low water, is 6 miles N. 76° W. from the south point of Dumet islet, with Petit Mont point bearing N. 44° W., open about one-half degree to the westward of Grand Mont point.

The Plateau de l'Artimon is situated to the northeast-ward of Haedik island, with depths very little inferior, and in some places superior, to those adjacent, the least being 6 $\frac{1}{2}$ fathoms at low water. The sea never breaks on it, though it be very heavy, but vessels should avoid it in coming-to, for fear of losing their anchors on the rocky bottom. It is 2 $\frac{1}{2}$ miles long north and south, and 1 $\frac{1}{2}$ miles broad. Its northern extreme is on the range of the NW. point of Haedik island and the SE. point of Belle-Ile; the southern is given by the south point of Haedik on with the centre of Belle-Ile; the eastern by Arzon steeple open a little to the westward of Grand Mont point; the western edge is just a little to the eastward of the meridian of the outer rock of Les Grands Cardinaux.

Belle-Ile-en-Mer, or simply Belle-Ile, is 9 $\frac{3}{4}$ miles in length NW. and SE., with a breadth not exceeding 5 miles. Its surface is about 160 feet above the sea, and its shores are generally high and steep. The island is well cultivated, although treeless, and yields good crops; the water on it is very sweet and good, and a large reservoir is maintained at Port Larron, on the NE. coast, for the supply of vessels. The population in 1873 was 10,000. From a military point of view, it is a very strong place, fine fortifications adding to its natural strength. In the way of curiosities, it has several druidical monuments. The principal industries are the preparation of sand for the glass-works of the towns on the Loire, and the preserving of sardines and tunny-fish. There are four signal-stations communicating with the main-land by electric telegraph.

The NW. extremity of Belle-Ile is the Pointe des Poulains, immediately off which is an island, called l'Ile aux Poulains, skirted by rocks, outside of which again are a number of shoals, called Les Poulains.

Light: Lat. $47^{\circ} 23' 19''$ N.; long. $3^{\circ} 15' 13''$ W.

On l'Ile aux Poulains is a square white tower, 54 feet high, exhibiting, at an elevation of 112 feet above sea-level, a *white flash* light, dioptric, of the third order, visible 14 miles. The interval between the flashes is 5 *seconds*. It is commonly called Les Poulains light.

Les Poulains rocks.

Les Poulains rocks constitute really the only danger on the coast of Belle-Ile. They extend from the meridian of Les Poulains point (one-fourth of a mile north of it) $1\frac{1}{4}$ miles to the westward. The westernmost, called the Basse Occidentale, having $31\frac{3}{4}$ feet over it, is 1 mile W. $\frac{3}{4}$ N. from the light. The northernmost, Le Grand Flaharn, with $8\frac{1}{4}$ feet, is a little over half a mile NW. $\frac{1}{2}$ N. from the light. All these spots break in bad weather.

The west coast of Belle-Ile is precipitous, very much cut up by the action of the sea, and unapproachable almost everywhere, even by small coasters.

Signal-station.

At Hastellic, about $2\frac{1}{4}$ miles to the southward of Les Poulains light, is a semaphore signal-station, from which messages can be sent to any port of destination in the vicinity. The house is yellow.

Anse de Donon.

The first bay where vessels can come to for shelter from easterly winds, is l'Anse de Donon, 4 miles to the southward of Les Poulains. The usual anchorage is in 8 fathoms water, sand and mud bottom, one-half mile from Bastille Law point, with it in line with Borzos village, to the eastward of Belle-Ile light. Farther out the bottom is decomposed rock. Communication is easy with Le Palais, the distance overland being only $3\frac{1}{2}$ miles.

Port Goulfar

In Port Goulfar shelter is found from northerly, north-westerly, and even westerly winds by small vessels. It is on the SW. coast of the island, due south from Belle-Ile light. The pilots generally have one of their sloops there. The bay is too narrow to accommodate vessels of great length; besides, the currents run strong and the bottom is rocky. Less than 1 mile to the southeastward, is Le Talut point, with a semaphore, communicating with the main-land.

Belle-Ile light: Lat. $47^{\circ} 18' 40''$ N.; long. $3^{\circ} 13' 45''$ W.

In the SW. part of Belle-Ile, showing above every object on the island, is a *white revolving* light, 276 feet above sea-level, visible 27 miles.* The interval of revolution is 1

* The range, 27 miles, applies only to large, high vessels. To a look-out only 9 feet above water, the light is only visible 23 miles.

minute. The illuminating apparatus is dioptric, of the first order. The light is exhibited from a round white tower, 151 feet high. When a vessel is close to the SE. shore of the island the light can only be seen from the rigging, being hidden by the high land. It will be designated as Belle-Ile light to distinguish it. The eclipses are not total within 10 miles.

The SW. and south coasts of the island are of the same nature as the west, being likewise deeply indented by bays. The points generally have a few outlying rocks, which do not extend far out, however. In Port Kerel is tolerably good anchorage. Two buoys (white) have been placed there to assist in getting under way. This is also a pilot-boat station. When the sea is too rough for them to cruise, they scan the horizon from Le Talut heights, and are always ready to board a vessel making the signal.

Port Kerel.

On Talut point is a signal station. The dwelling is yellow. Geographical number B. G. P. N.

Semaphore.

At about one-fourth mile to the eastward of Port Kerel is Bangor island, one-third mile to the southward of which is a rock, called La Truie, upon which has recently been erected a beacon, painted black and red. There is plenty of water 200 yards from it on all sides.

La Truie.

To the eastward of Bangor island, about one-half mile distant, is the Pointe du Grand Village, between which and the Pointe de Saint-Marc to the eastward, is a bay, the head of which is bordered by the Plage de Saint-Marc. There is anchorage here in 11 fathoms, sand and rotten rock, protected from winds between NW. and ENE., 700 or 800 yards from Saint-Marc point, with the rocks off Pouldon point on with those off the Pointe de l'Echelle or Beg-er-Squèle. If the wind shift from between the points mentioned, vessels must put out, as the anchors will not hold well.

Anchorage.

To the eastward of the above, off the Port du Pouldon vessels can also come to, but it is a poor anchorage. Communication with the shore is made by vessels anchoring in this neighborhood, in the inlets of Herlin, Port Blanc, and Pouldon.

Pouldon anchorage.

The southernmost point of the island is the Pointe de l'Echelle or Beg-er-Squèle. Along here the bottom is rocky and the tidal currents make a bad chop sea. The coast to the eastward of it trends to the northeastward to the Pointe

Pointe de l'Echelle.

Port d'Arzic. d'Arzic, to the northward of which is the anchorage of the same name, where pilots and coasters often drop anchor. There is also a signal station here, with yellow house. Geographical number B. G. P. N.

Loc-Maria. The port of Loc-Maria dries at low water; a jetty, built a few years ago, protects the inner harbor.

Basse de la Rade. The Basse de la Rade is five-sixths mile off the east coast of Belle Ile. There being a depth of $28\frac{1}{2}$ feet over it at low water, it is not a dangerous place except to very large vessels, and the latter would not be apt to come so close inshore.

Pointe de Kerdonis. The easternmost cape of Belle-Ile is Kerdonis point, to the northward and eastward of which is a buoy, so placed that vessels doubling it will also clear Les Galères.

Les Galères. The latter are a series of rocks, the principal head of which dries 3 feet at low-water springs. The ebb-tide sets on it strong, and must be guarded against. They are cleared in the eastward by keeping Arzie point open of Kerdonis point, and in the north by keeping the houses of Le Palais in sight. At night, the light of the latter town open of the land leads clear.

Anchorage. Along the coast, one-half mile off shore, between Kerdonis point and La Truie, $2\frac{1}{2}$ miles to the west-northwestward, there is anchorage in $5\frac{1}{2}$ fathoms and over; but it is only tenable with the winds from WNW. through south to SSE. To the northwestward of La Truie the water is shoaler. The favorite anchorages are off the Port d'Yorck and the Port Blanc. The object of greatest interest to vessels here is the reservoir at Port Larron. Watering ship is an easy matter, as boats may be filled at high water through a hose. The key is at Le Palais. The landmarks generally used to fix a ship's position, when intending to anchor, are the Gros Rocher, the black tower on La Truie, and Kerdonis, Ramonet, and Taillefer points.

Le Palais. Le Palais is a town of 5,000 inhabitants, and gives its name to the roads in the NE., where vessels can anchor in 2 to 11 fathoms water, according to the distance from shore. The bottom is sand and mud, and the shelter is perfect from winds between south and WNW. In the day-time vessels generally come in on the range of Le Palais light and church, anchoring when the lead shows the desired depth. At night



Belle Ile from NNW.



Ile de Groix from seaward.



Ile de Groix from the East.

vessels generally come-to in $5\frac{1}{2}$ fathoms, with Le Palais light S. 66° W., and La Teignouse light N. 31° E., or Les Poulains light just hidden by Taillefer point.

Ramonet point open a little to the westward of the mill of Port Salio, gives $2\frac{2}{3}$ fathoms at low water; by opening it a little more, $5\frac{1}{2}$ fathoms will be found; as Les Poulains point opens from Taillefer point, the depth is $8\frac{1}{4}$ fathoms, and this may be considered as the last range, as the westerly swell is felt outside of it.

When the wind shifts to NW., especially after a SW. blow, the sea becomes too heavy in the roads for vessels to remain; they must find a lee under the SE. shore. Nor can they remain in the roads during SE. winds.

The harbor of Le Palais dries at low water. A tide-gauge, distinctly visible outside, gives the height of water inside. At the lower end is a wet-dock, the gates of which are open for 1 hour at high water; only 9 feet can enter it.

On the mole-head, on the south side of the entrance to Le Palais harbor, is a circular tower 27 feet high, exhibiting a *fixed white*, dioptric, fourth-order light, 30 feet above sea-level, visible 9 miles.

Light: Lat. $47^{\circ} 20' 53''$ N.; long., $3^{\circ} 09' 21''$ W.

Nearly due east, $1\frac{1}{2}$ miles from Le Palais light, is a shoal of the same name, with 28 feet of water on it.

Basse du Palais.

The Pointe de Taillefer is the most prominent headland on the NE. coast of Belle-Ile, and is recognizable by a semaphore. It is high and bold, with no outlying shoals. The dwelling of the signal-station is yellow. Geographical number, B. G. P. N. West-northwest, $2\frac{3}{4}$ miles from it, is the Pointe du Cardinal, immediately off which is a shoal, called the Basse de Sauzon, marked by a red tower.

Pointe de Taillefer.
Semaphore.

Pointe du Cardinal.

To the southward of the latter point is the village of Sauzon, the port of which is an arm of the sea extending three-fourths mile to the southward, with 6 feet of water.

Sauzon.

On the extremity of the mole of Sauzon is a *fixed red*, dioptric, fourth-order light, 30 feet above sea-level, visible 7 miles, exhibited from a circular tower 27 feet high. A screen hides it when bearing S. 14° W., in line with Les Bruideaux and La Basse Gareau, which shoals are also marked by towers. In the NE. quadrant it only lights the

Light: Lat., $47^{\circ} 22' 22''$ N.; long., $3^{\circ} 13' 14''$ W.

S. point of Quiberon peninsula and the passage of La Teignouse. There is a life-saving station here.

Life-saving station.
Bancs du Taillefer. Off the NE. coast of the island, $1\frac{1}{2}$ to 3 miles from Taillefer point, are three banks, called Taillefer banks, over which are depths of $6\frac{1}{2}$ to 9 fathoms, with exception of one 21-foot patch, which bears due E. from Les Poulains light, and NNW. $\frac{1}{4}$ W. from Kerdonis point.

Plateau des Birvideaux. The Plateau des Birvideaux is 6 miles from Belle-Ile and from the main-land, and directly between Belle-Ile light and Port Louis. The sea always breaks on it in bad weather, the shoalest spot being at a depth of only $8\frac{1}{2}$ feet. The plateau is about 1 mile wide, and the whole of it should be avoided in rough weather.

Belle-Ile light, open to the westward of Borderun, leads clear of the plateau outside of it, as does also Les Poulains light, open 1 point to the eastward of Belle-Ile light. Les Poulains light, open to the westward of the same, leads inside the plateau, and La Teignouse light, hidden by point Beg-er-Lan, clear to the northward.

Tidal currents. The tidal currents in the neighborhood of Belle-Ile act differently in different places. At low water, off Kerdonis point, the tide runs NW., while off Les Poulains it sets WNW.; at half-flood it sets to the NE. off both these points, but ENE. off Taillefer. At high water the direction is SE. and the strength 3 knots off Kerdonis point, but off Taillefer and Les Poulains the direction is S. and the strength much less. During the remainder of the ebb, the directions change from the southeastward to the northwestward.

In the offing. In the offing there is a retardation of $1\frac{1}{2}$ hours in the making of the tides, and the directions of the currents change with the hands of a watch.

In Belle-Ile channel. The strength and direction of the tidal currents are somewhat modified in the middle of the channel of Belle-Ile, (separating it from the main-land.) At low water the current sets WNW.; at half-flood NE., turning through N. At about this time, if the winds have been southerly, instead of completing the rotation to the southward, the current backs round to NNE. and N. at high water; at half-ebb the direction has reached SW., returning to WNW. at low water. The greatest strength is $2\frac{1}{2}$ knots at springs, at half-ebb. The maximum speed of the flood is at half-flood, and never exceeds 2 knots.

In case of easterly winds the rotation is complete, but, during the first two hours of ebb, the strength is insignificant, even at springs. At high water the set is ENE., with a speed of one-half knot.

Belle-Ile is one of the very best land-falls to make on the W. coast of France. When seen from the westward, it first appears to be three islands, which afterward join, making high land with steep cliffs. Villages and a score of mills are afterward seen in profile on it, and in the SW. part will be noticed the tall light-tower. Land-fall.

In thick weather soundings are an invaluable assistant to the navigator off this coast. At 114 miles from Belle-Ile light, on its parallel, are depths of 93 fathoms over sand and shells; at 97 miles the same bottom is found at 82 fathoms. The sand becomes mixed with mud at 80 miles, and 44 miles off is pure mud at 62 fathoms; at 20 miles from the light the depth is 55 fathoms over mud. The nature of the bottom then changes to mud, gravel, and rock in 50 fathoms water 13 miles from the island. Soundings.

Vessels coming from the northward and bound for the Loire would find an advantage in passing to the northward of Belle-Ile, with northerly or northeasterly winds. If coming from the westward, the land-fall would determine on which side of it to pass. If bound for the Vilaine or Quiberon bay, especially the latter, distance may be saved by coming in to the northward and through one of the passes between the islands off Quiberon peninsula.

In addition to the directions given above, it may be stated that from the Plateau des Birvideaux Belle-Ile light is seen between the eclipses, but very feebly. When it shows constantly bright, the vessel is to the southward of the bank. To avoid Les Poulains, keep La Teignouse light bearing nothing to the northward of N. 70° E., or give a berth of 1 mile at least to Les Poulains light. Passing to the northward of Belle-Ile.

Should a vessel come round the east end of the island, to find a lee, she should steer for Haedik light N. 62° E. (nothing to the eastward of that) until Le Palais light is made, when the course may be laid north, and finally N. 72° W. for the latter. Making Le Palais roads.

Passing round the west end of the island, keep 1 or 2 miles from shore, so as not to be becalmed, and to avoid

the strength of the currents, until Belle-Ile light is seen to the eastward of that of Les Poulains, when the shore may be approached to one-half mile, in the day-time. At night use bearings of the lights; after Belle-Ile light passes to the eastward of the *flash* light on the north point, steer E. by S. for Haedik light until that of La Teignouse bears N. 31° E., when steer away from the latter bearing so or a little more to the northward, and anchor in $5\frac{1}{2}$ fathoms, when Le Palais light bears about SW. by W. $\frac{1}{2}$ W.

To clear the
Taillefer banks.

The Taillefer banks may be approached quite close, even in heavy weather, although the sea break on them, but the semaphore on Haedik island should be kept to the southward of the middle of l'Ile aux Chevaux. The latter open to the southward of Haedik island leads clear to the northward. A good mark for the shoalest spots on the banks is Merezel mill S. $28^{\circ} 37'$ W. over an angle of Le Palais citadel. By opening the former a little to the southward of the citadel, a vessel will come clear to the eastward, and bringing it in range with the barracks leads clear to the westward.

Belle-Ile chan-
nel.

To avoid the many other rocks near the northern shore of Belle-Ile channel, so many landmarks must be used that, for a captain beating about there for the first time, the best directions would be not to go farther than 3 miles from that island. By examining then the different shoals, he would be able to place all the landmarks the second time.

Black buoys mark Cariou and Le Chenal, and a red and black one Gouëvas shoal. The red tower of Les Esclassiers can be approached to 220 yards, after which the high rocks of Houelhérès should be kept open to the northward of Houat island. On nearing the latter, the red tower of Le Rouleau need not be given a very wide berth, and a ship might tack on the alignment of it and the Esclassiers tower, were it not for the chain of rocks on the southern border of the Chaussée de l'Ile aux Chevaux, between which and Houat island are safe depths. To remain clear to the southward of them, let the reef of Drevantec-Bras, the southernmost of the chaussée, only come slightly on with Haedik island, from the time that Le Rouleau tower is slightly open to the eastward of that of Le Bonen-Bras, until it has passed to the westward of that of Le Grand Coin. A ship may then

stand on to 225 yards of the red and black buoy of the Pot-de-Fer before tacking, and pass quite close to l'Ile aux Chevaux. The SE. point of the chaussée is avoided by keeping the red tower of Er-Palaise on with Haedik island, and while between it and the Chariot buoy, limiting the rocks in the SE., a vessel should tack before it (Er-Palaise) opens to the southward of Houat island. To the eastward of the Chariot buoy, the buoy should always be kept to the northward of Belle-Ile, to remain clear of the Basse des Cardinaux. As soon as Cohfournik tower comes in line with Saint-Gildas-de-Ruys the boards may be extended in the NE. Le Four light due east leads clear to the southward of all dangers off Haedik island.

Large vessels frequently double Haedik island as well to enter Quiberon bay as to make the Vilaine or the northern channel to the Loire. Several precautions should be taken.

Passage west
of Le Four.

The landmarks used are Haedik and Le Four light-towers, and the steeples of Saint-Gildas, (on the Grand Mont,) Le Croisic, Bâts, and Guérande.

Landmarks.

Coming in from seaward, neither Les Cardinaux rocks nor Le Four bank should be approached nearer than $1\frac{1}{2}$ miles. As the current of the ebb makes 2 knots an hour at times, it would be well to steer for either Le Four or Dumet islet if coming from the westward, and for the Grand Mont if coming from the southward.

Directions.

In the former case steer N. 80° E. for Le Four light until that of Haedik is two points abaft the beam, (N. 32° W.,) when change the course to N. 27° E., steering afterward according to what anchorage is to be made.

Coming from
the westward.

If bound for the Vilaine, the course N. 27° E. should be kept for 9 miles, when Penlan light will be seen on the horizon, bearing N. 52° E., which latter course will take a vessel into the mouth of the river. To verify the bearing of this light, the dome of the old abbey of Prières is in range with it, beyond.

Making the
mouth of the
Vilaine.

This course is made at night even better than by day.* It is advantageous to come in with the flood-tide, as it sets directly with the vessel.

* It has been decided to construct a light on the southern point of Les Grands Cardinaux, and it will probably soon be done.

Caution.

If the ebb-tide be making while the vessel is off Haedik island, allowance must be made for it, as it sets on the rocks. In case of the wind falling it would be well to head one point to starboard of the course, or even to keep on the first course, N. 80° E., for Le Four, long enough to pass between Guérin and Fournier shoals, that is, until Haedik light bears N. 53° W., when N. 20° E. will take a vessel clear of all dangers to the bearing of Penlan light, N. 52° E. Neither of the two shoals mentioned is much to be feared, save in very heavy weather, as the least depth on the former is 11 fathoms, and on the latter 16 fathoms, at dead low water.

Coming from the southward.

Coming from the southward in fine weather, the course should be shaped to pass midway between Haedik and Le Four light-towers, the only precaution necessary being to avoid the Basse Capella, the north end of Guérande bank, which breaks with very little swell, although covered by $3\frac{2}{3}$ fathoms water. To pass clear of it keep Haedik light bearing to the northward of N. 50° W., until that of Le Four bears to the eastward of N. 57° E.

In heavy weather.

In case of heavy weather it would be best to make the first course given, to the westward of Fournier shoal; that is, 2 miles from the little black tower of Cohfournik. During flood-tide the smoothest water would be found in that channel. With the ebb-tide there would be a pretty bad sea there, but no breakers as on the shoals to the eastward.

Currents in Le Four Passage.

Allowance should be made for the currents in Le Four passage, particularly by vessels beating in. At low water they set west with a speed of $1\frac{1}{2}$ knots. In the early flood the set is NW., and afterward for the Vilaine, and the strength at springs is 2 knots. The first of the ebb sets south, but it is speedily inflected to SW., and at that time it attains its maximum strength, which is 3 knots when spring-tides coincide with a freshet in the Loire.

During freshets in the Loire and the Vilaine, and with an easterly wind blowing, the currents are well defined, the waters of the Loire dividing into two branches, one of which passes outside of Le Four and Belle-Ile, while the other skirts the coast, joins the current of the Vilaine, and they together run to the westward and out through La Teignouse pass.

Vessels beating in with the flood-tide against northerly winds should pass as close as prudence will allow to Haedik island, as the current sets $1\frac{1}{2}$ miles NNE. near Belle-Ile; in beating out against the flood-tide and southerly winds, keep near Le Four.

Beating in and out.

It is high-water springs at Tréhiguier at 3^h 48^m; at neaps the time is very variable, being between 30 and 65 minutes before the hour at Saint-Nazaire. In the upper part of the river the propagation of the tide is very slow, it being high water at Redon 2 $\frac{3}{4}$ hours after Tréhiguier. The heights of high water are practically the same as at Saint-Nazaire, the mean spring rise being 16 feet at the mouth of the river. Low water occurs 23 minutes later than at Saint-Nazaire.

Tides in the Vilaine river.

The current of the ebb during a freshet in the river attains a velocity of 5 knots off Tréhiguier, and in the narrower parts of the stream. The strength of the flood is much less, and, in fact, after heavy rains, this tide is prevented entering.

Tidal currents.

During the summer the tide turns half an hour after low water, at the mouth of the river, and earlier near the south shore than near the northern.

Turn of the tide.

The entrance to the Vilaine is recognizable by the reddish cliffs, the light-tower, Prières abbey, and Billiers steeple, on the northern side of the mouth; on the southern side, Halguen point is about equal in height to the cliffs opposite, and two mills will be seen to the right of the spire of Pen-netin steeple.

Entrance.

Three channels lead into the mouth of the river, one to the northward and one to the southward of the rocky bank named La Grande Accroche, and one called the southern channel.

To pass to the northward of La Grande Accroche, steer N. 52° E. for Prières Abbey, a little to the left, and touching Peulan light-house. In this channel are depths of only 5 feet at low water.

Direct channels.

Prières Abbey N. 46° E., over the guard-house to the right of the light, leads in to the southward of the bank, with depths of $4\frac{1}{2}$ feet at low water. Whichever of the two channels be taken, port the helm as the black beacon on the rocks off Kervoyal point comes in line with the mill of Bile point, near Penerf, and steer S. 87° E. away from it. This course

leads into the river, and passes 328 yards north of the red iron beacon of the Petit Sécé, which shoal dries $7\frac{1}{2}$ feet at low water.*

The latter range is not easily made, particularly at high water, when Kervoyal beacon shows only a little above water; in that case another alignment may be substituted—that of the isolated tree of Landrezec over the northernmost of Kervoyal rocks.

It is not vitally important to keep exactly on the alignment, as the bottom is muddy and quite even; only a few rocks have to be avoided.

At night.

The entrance may be approached at night either with Haedik light S. 57° W. astern, or Le Four light astern S. by E., until Penlan light is made in the N. 57° E., when steer for the latter, and when about 1 mile from it head to the eastward and steer by the lead. The former of the two courses is in some respects the better, because making the one light ahead, with the other astern, is a good check on the vessel's drift.

After two hours of flood-tide, 13 feet will be found over the bar, and the muddiness of the water reduces considerably any sea that may be heaving.

During the ebb, however, the sea is short, and if there be heavy weather outside a line of breakers extends across the entire entrance, save between the Varlingue rocks.

Southern channel.

The southern channel, which leads in among the Varlingue rocks, is very narrow, but has $2\frac{1}{4}$ feet more water than the direct channel. No vessel of any size should attempt to enter without a pilot.

Directions.

Steer ENE. for Pennetin (or Peu-Étain) mills, until at a distance of three-fourths of a mile from Belair islet, which shows plainly against the shore, when Prières Abbey will pass in range with l'Avalac mill beyond, bearing N. 23° E. Shape this course until Pennetin steeple comes over Camaret beach,† when port the helm and steer to pass 380 yards

* This beacon is shortly to be replaced by a red tower, which will be much more distinctly visible; when that has been done, a vessel may leave the course for Prières Abbey as soon as this tower is seen in mid-stream up the river, and head up with it one point off the starboard bow.

† A vessel can head up-stream when the beacon of Petit Sécé comes in line with Moustier chapel beyond, if it can be seen.

to the northward of the Petit Sécé beacon, (or tower,) or with it 1 point off the starboard bow.

A vessel leaving the river through the main channel may use the same bearings as in entering. Leaving the river.

After passing the Sécé beacon, steer for the Maison Tréhiguier in range with the Kerguen woods beyond, pass about 1 cable from Scal point, and come-to in $3\frac{3}{4}$ to $4\frac{1}{2}$ fathoms abreast Tréhiguier village, 200 yards from the river bank. This is only a temporary anchoring-ground, as a bad sea reaches there sometimes; besides, no supplies can be obtained from the town, vessels having to get provisions from Muzzillac, on the right bank. Tréhigaier anchorage.

About 1 mile up-stream from Tréhiguier is another anchorage, just above Vide Bouteille point, where a good lee is found, with $16\frac{1}{2}$ feet at low water. Vide Bouteille anchorage.

The town of Rennes is situated at the junction of the Ille and Vilaine rivers, about 62 miles from the mouth of the former. Portions of it are very handsome, and among the institutions of interest to mariners are several good hospitals. The population is 52,000. Nothing larger than barges can ascend to it. The markets are the best in Brittany. Rennes.

Redon is a place of about 5,500 inhabitants, situated at the junction of the two branches of the canal from Nantes to Brest, on the right bank of the Vilaine, about 25 miles from the mouth. One of the principal industries is ship-building. Vessels of 200 tons can reach it. The total dues and charges on a schooner of 88 tons, cargo inward 150 tons coal, outward 80 tons pitwood, are about 150 francs. Labor, 3 francs per day. Redon.

La Roche Bernard is on the left bank of the river, 9 miles from the mouth. The stream here is spanned by an iron-wire suspension-bridge, supported by two granite piers, 626 feet apart. The elevation of the roadway above high water, 108 feet. La Roche Bernard.

Having shaped a course N. 27° E., as directed above, through the passage west of Le Four, a vessel bound for Quiberon bay would make only $5\frac{1}{2}$ miles on that course, steering then N. 52° W. away from Le Four light, passing 1 mile from La Recherche bank. Entering Quiberon bay.

At night.

At night steer up between Le Four and Haedik lights, and change course, with the former astern, to N. 52° W. This course leads through the northern part of Haedik roads to a good anchorage in the upper part of the bay, on the line between Navalo and Port-Haliguen lights, bearing, respectively, N. 63° E. and S. 63° W. with La Teignouse light south.

On this long course, N. 52° W., a check can be kept on the vessel's drift. When La Teignouse light passes in line with Belle-Ile light, the *white* one of Crac'h should bear N. 1° W., and that of Port-Haliguen S. 85° W. As the vessel advances into the bay Le Four light becomes very dim. Belle-Ile light can only be readily seen from the rigging, as the beam of light here passes overhead. With a little attention, however, it can be indistinctly seen from deck.

There are several other passes for vessels entering or leaving Quiberon bay; those of La Teignouse, Le Beniguet, and Les Sœurs.

Passage de la Teignouse.

Under the name of the former are five passes, between the peninsula of Quiberon and the Chaussée du Beniguet, two of which dry at low water, and are only of occasional use to coasters. Of the others, the Passage de la Teignouse proper has depths of 7½ to 27 fathoms, and can be entered at night. It also admits of beating in or out.

Directions.

The Gouëvas bank divides the southern entrance to this pass into two branches. Coming from the westward to pass to the northward, between it and the Basse du Chenal, bring La Teignouse light-tower midway between the Petit Mont and the Grand Mont of Saint-Gildas, or simply steer to pass midway between the buoys on the two shoals, passing the red one of Gouëvas also to starboard. Depths of over 5½ fathoms at low water are carried to 275 yards of La Teignouse.

Caution.

The black and red buoy, marking the Basse Nouvelle, 800 yards to the southeastward of the light, is sometimes dragged under water by the current; in that case pass about 350 or 400 yards from the light, or else over one-half mile from it.

To the southward of the Basse Nouvelle the channel is 1 mile wide.

To the eastward of Gouëvas the entrance to La Teignouse ^{Entrance east of Gouëvas.} pass is 1 mile wide, and is limited by the red and black and the red buoys on the shoal in the westward, and the tower on Les Esclassiers in the eastward. Lomariaker steeple, N. 32° E., in range beyond La Teignouse light, leads through the middle.

To enter this pass at night, bring port Navalo light N. ^{At night.} 43° E., open a little to the eastward of that of La Teignouse, and steer for it so until about 300 yards from the latter, when port the helm a little to pass at that distance from it.

Vessels beating in or out are warned when to tack on the ^{Beating through.} N. side of the channel by the buoys on the Basse du Chenal and Basse Cariou, and the black tower on Er-Pondeu. On the S. side the red tower of Les Esclassiers may be approached to 2 cables' lengths in the W. and one-third mile in the N. In addition to the buoys on Gouëvas, the northern edge is on the alignment of Beg-er-lan mill, (on the SW. point of Quiberon peninsula,) and the black tower on Le Four rock, (2½ miles W. ½ N. from La Teignouse light.) The same tower in line with Quiberon semaphore (well inland) gives the southern edge.

The pass to the northwestward of La Teignouse is deep, ^{Pass west of La Teignouse.} and is sometimes a convenient short-cut for vessels leaving the upper part of Quiberon bay. All dangers will be avoided by keeping the Esclassiers tower open 5° to the eastward of the SE. point of Belle-Ile, until Toul-Bras islet comes in line with Conguel point, (southern extreme of Quiberon,) when change course 1 point to starboard to gain Belle-Ile channel.

There is a narrow pass to the eastward of the Esclas- ^{Passage des Esclassiers.} siers tower, which has the advantage of feebler currents than in the main channel. Kerdenet mill, on Belle-Ile, S. 45° 30' W., over a salient angle of Le Palais citadel, leads through it. There is but scanty room for leeway to the westward of this range.

At low water in La Teignouse pass there is a 3-knot cur- ^{Currents in La Teignouse pass.} rent to the NW., changing to NE. at half-flood, at which point it remains steady until high water. When that occurs it sets ENE. with but little speed, and turns quickly to S. and SW. at half-ebb, running 2 knots an hour, and finally

returns to NW. The maximum strength of the ebb is 4 or 5 hours after high water. It is comparatively slack water at $1\frac{1}{2}$ hours after high and low water.

Passage du
Beniguet.

The pass between the Chaussée du Beniguet and Houat island is quite easy of navigation since the construction of the red towers on Le Bonen Bras and Le Rouleau, on the southern side of the channel, and the black one on Le Grand Coin on the northern. Either one can be approached to 55 yards with $5\frac{1}{2}$ fathoms draught. After passing the former, a vessel should not come to the eastward of the alignment of it and the western extremity of Guric islet until Le Grand Coin comes in line with Les Poulains point.

There is a $3\frac{2}{3}$ -fathom shoal in the middle of the northern part of the passage. To pass to the westward of it, keep Le Grand Coin tower in line with the eastern extremity of Belle-Ile, and to pass to the eastward of it keep the same tower in line with Le Palais light or steeple.

Houat island
anchorage.

To the northward of Houat island is good anchorage for large vessels in $4\frac{1}{2}$ to 5 fathoms water, over sand and mud. Gales of wind have been ridden out there.

Directions.

Vessels seeking this shelter generally come in round Haedik island and Houat bank. Having doubled them, steer for the high rock of La Vieille, in line with the W. point of Houat island, and come to between the former and the village.

Passes north
of Ile aux Che-
vaux.

Vessels can pass between l'Ile aux Chevaux and Houat island, and between the latter and Haedik, with not less than 17 feet at low water. These passes are only practicable during the day.

Directions.

Coming from the northwestward a vessel may head for l'Ile aux Chevaux, open to the southward of Haedik island, until one-half mile from it. Then starboard the helm and steer for Les Sœurs beacon open slightly to the northward of Haedik light, until about 2 cables from it. A NE. course then leads out into Quiberon bay.

The shoalest water is found abreast l'Ile aux Chevaux. The black and red buoy of Men-er-Vag is passed to port in following the above directions, but it may be passed to starboard with Le Palais behind the middle of l'Ile aux Chevaux astern. This range leads out into Haedik roads,

to the southward of the $6\frac{1}{2}$ -foot shoal of the channel of Les Sœurs.

Another route is easy to follow, passing to the northward of the latter. Starboard the helm on approaching Men-er-Vag buoy, and steer to pass midway between the towers on Er-Spernec Bras and Er-Rouzès NE. by E.; or else steer N. by E. $\frac{3}{4}$ E., to pass midway between the tower-beacons on Men-er-Houteliguet and Er-Spernec-Bras. Taking this latter channel the ship should run as nearly as possible midway between the towers to clear Er-Spernec-Bihan on the starboard side and an unnamed shoal on the port, passing afterward about 450 yards to the westward of Men Groïse tower-beacon.

Drevantee pass is quite wide, with a least depth of 16 ^{Drevantee passage.} feet at low water, and leads into one of the foregoing channels. To enter it from the southward, steer N. 16° E., with the two eastern points of Houat island, Beg Pel and Er Yoc'h, in line, and after passing l'Île aux Chevaux, head more to the eastward to pass to the northward of Men-er-Vag, between Er Spernec-Bras and Er Rouzès, (the latter in line with Dumet island,) or to pass to the southward of Men-er-Vag as directed above.

The pass of Les Sœurs is tolerably easy of navigation ^{Passage des Sœurs.} since the erection of a red tower on Er Palaire; the least depth is $22\frac{1}{3}$ feet at low-water springs.

Approach Er Palaire tower on any course between east ^{Directions.} and NW. by N. (though north) until about 2 cables to the westward of it, when head N. 18° E. for Er Rouzès tower, with Les Sœurs beacon one-fourth point off the starboard bow. When abreast the latter, steer round it keeping 1 cable's length off, and a northeasterly course will lead into Haedik roads.

Ships of large draught have beaten through here, with ^{Beating through.} good pilots. The only dangers to be watched are the shoal off Bonen-bras, on the west side of entrance, and the patch to the southward of Er-Rouzès. The former is avoided by not letting Les Sœurs beacon open three-fourths point to the right of Er Rouzès, until Men-er-Vag buoy comes in range with Houat steeple, which latter alignment should then not be passed in the SW., abreast of Bonen-bras. With regard to the rock of Bonen, 140 yards to the southward of Er Rouzès, the best directions are not to come

nearer than 2 cables' lengths to the southeastward or southwestward of Er Rouzès.

Currents.

The tidal currents in the pass of Les Sœurs constitute the principal difficulty in piloting through it. The first of the flood runs north, 1 hour after low water; and the ebb sets to the southward one-half hour after high water. The strength of the latter at springs is sometimes $2\frac{1}{2}$ knots.

Haedik roads.

A fleet of large vessels can maneuver in Haedik roadstead, coming to afterward with good holding-ground. The only danger in the N. is a 13-foot sand-bank; the tower of Men Groïse in line with the middle of the low neck uniting the SE. portion of Houat island with the centre, leads S. of it; to clear it in the SE., Er Rouzès tower must not come more than half-way from Grimaud Pel (SE. of l'Île aux Chevaux) to Drevantec-bras; in the NE., Les Grands Cardinaux should not be brought in range with Er Goualennec.

Directions.

Steer to the northward to pass a half-mile to the eastward of Kohfournik, the exterior one of Les Cardinaux rocks, and then NNW., anchoring to the northward of Er Goualennec, or with Yoc'h-Bras just open from Pointe Hal-énégui.

At night.

To make the roads at night steer up the pass W. of Le Four until this light bears SE. by E. $\frac{1}{2}$ E., and La Teignouse NW. by W. $\frac{1}{2}$ W., when head for the latter with the former astern. Round to with starboard helm when Haedik light bears SW., and anchor in 8 fathoms water, soft mud bottom.

Having one light ahead and one astern, the vessel's drift is easily detected and checked.

Port de la Chèvre.

Vessels sometimes run into Port de la Chèvre for water, which can be obtained of excellent quality. The depth is $5\frac{1}{2}$ fathoms, sand and mud. The usual anchoring-ground is W. or SW. of La Chèvre rock. To reach it from the northeastward, steer S. 58° W. for Er Palaise tower just open of the Pointe du Vieux Château.

Beating - room in Quiberon bay.

The limits have already been given of La Recherche and l'Artimon banks. There are several others that vessels must steer clear of. The Banc de Quiberon is always left in the W. in beating, tacking ship before the buoy on the S. edge of the bank comes on with Les Esclassiers tower, up to the time that Port-Haliguen light is in range with Loc-

Maria steeple. After that the boards may be extended in the W. to $4\frac{1}{2}$ fathoms water, with Olibarte buoy under the redoubt of Conguel. At the head of the bay, the limit of the $4\frac{1}{2}$ -fathom depths is with Quiberon semaphore to the southward of Beg-Rohu point, or Lomariaker mill, in the northeastward, well open to the right of the W. point of the entrance to Saint-Philibert river. All the shoals between the Crac'h river and Saint-Gildas are avoided by keeping Carnac steeple bearing to the northward of N. 49° W.; or, failing good compasses, Saint-Gildas steeple over Grand Buisson beacon leads in deep water, in front of Crac'h river and up to abreast of the western beacon of Les Buissons de Méaban. The Basse des Buissons lies outside the range of the two beacons, and should not be approached nearer than a half mile. The other shoals, of Méaban and Thoumiac, are cleared by keeping the western beacon of Les Buissons de Méaban to the right of the Crac'h lights.

There is a shoal spot, called the Roche Souris, covered by 4 fathoms water, $2\frac{1}{4}$ miles to the southward of the mouth of Crac'h river. Its bearings are the western beacon of Les Buissons midway between Navalo light and Petit Mont, and Crac'h steeple as much to the westward of the higher light of that river as the latter is from the lower. The head of the shoal is only a few square yards in extent, and has good depths on all sides.

Roche Souris.

With the exception of this rock, the bottom of the bay, within the limits given above, is very level, of sand and mud. In some few places are flat rocks, but the anchors quickly drag over them, and immediately hold in the adjacent mud.

The shores of the estuary of Le Morbihan are cut up by innumerable inlets, and, running among its many islands and shoals, are only small channels, leading to Vannes and Auray.

Le Morbihan.

The town of Vannes, the population of which is 15,000, is situated at the head of an inlet in the NE. corner of Le Morbihan. It has a small harbor, almost surrounded by moles, which can be entered by vessels of 150 tons burden. Coasting-vessels take away the principal articles of export, such as coarse breads, hardware, beer, salt; the imports comprise wood from Norway and Sweden, coals from

Vannes.

England, and iron-ore from Spain. Ship-building is carried on.

Auray.

The population of Auray is about 4,000. The town is situated 7 miles up the river of the same name, which empties into the western part of Le Morbihan, near the entrance. The principal occupation is fishing, and the only trade is coastwise.

Tides in Le Morbihan.

The tides in Le Morbihan present several phenomena, because of the narrowness of the mouth in comparison with the extended tidal area inside.

It is high water, at full and change, 5 minutes after the time at Saint-Nazaire; but at the quarters it is 6 minutes before. Low water occurs, at full and change, 25 minutes before Saint-Nazaire, and at the quarters 3 minutes before. When it is high water outside, the flood continues to pour in, the height of the tide, one-half hour after high water, still being greater in the offing than inside. This is more especially the case in the eastern extension of the bay, the height of high water at Auray being approximately the same as at Port Navalo and Saint-Nazaire, but being $1\frac{3}{4}$ feet less at Vannes, at full and change. Low-water level at Port Navalo, as well as in the Auray river, is 1 foot higher than at Saint-Nazaire, while in Le Morbihan proper the difference is, at times, 3 feet.

Currents in the offing.

The tidal currents, off the entrance to Le Morbihan, have a general tendency NW. and SE., turning in the opposite direction from the hands of a watch. At low water there is a 2-knot SSE. current; this diminishes in strength, and, after $1\frac{1}{2}$ hours of flood, has a minimum speed, and an east-northeasterly direction. At the fourth hour of flood-tide the set is to the NNE., with a velocity of 2 knots, and at high water, north. One hour after high water is again a minimum strength, and one hour later still the set is SW., 2 knots.

Nearer the entrance of Port Navalo, both the directions and strength differ materially from the above. The greatest speed at springs is 8 knots abreast of Port Navalo, and the current follows the channel.

Among the rocks, off the entrance, the flood-tide runs NE., and the ebb SW.; the retardation of slack water is

only one half hour; the Crac'h river and the head of the bay deflect a part of the flood-tide to the northward.

The landmarks used in entering Le Morbihan are Port Navalo light-tower, the church-steeple of Badène, which looms up very high in the interior, and the steeples of Arzon, to the right of the light, and Lomariaker and Auray to the left of Badène. Besides these the tower of Baguen-hir and the beacons of Le Grand Buisson and Le Buisson de l'Ouest are visible from some distance. Landmarks.

The rocks on which these latter are built give good indications of the height of the tide, the Roche des Bœufs being covered when the tide has risen 5 feet, the Grand Buisson de l'Ouest $6\frac{3}{4}$ feet, and Kerhélégui rock 12 feet. The plateau of Baguen-hir, N. of the tower, has two heads, the northernmost of which protrudes $11\frac{3}{4}$ feet above low water, and the one nearer the tower $12\frac{3}{4}$ feet. Tide-marks.

Of course, this mode of estimation is of use only in very smooth weather.

There is a channel with $29\frac{1}{2}$ feet of water over the bar of Le Morbihan. Large vessels sometimes enter and anchor off Lomariaker. Ship-channel.

While in the offing bring Badène steeple open of Port Navalo point and over the eastern part of Petit Veisit island, and steer for it until Arzon mill comes over the middle of Arzon bay, when port the helm and bring Badène steeple to just touch the E. end of Petit Veisit island. When Arzon mill is well on with the N. point of Arzon bay, bring Badène steeple over the middle of Petit Veisit islet and stand on past Port Navalo point. When inside the latter, bring Mouton beacon (which will be seen off the starboard bow) in line with the summit of Ile Longue, and when at 1 cable length from the former, starboard the helm and bring it gradually astern in range with Kernès mill (the first one E. of Arzon) and steer away, being careful not to let the ship be drifted to the northward of that alignment. Sometimes the tide runs so strong that the ship's head must be laid W. to make the course. After passing Gregan tower (to starboard) steer N. $26^{\circ} 30'$ W., on the range of Kerhern mill outside Le Grand Harnic, and anchor on that range between the cross-bearings of Larmor mill, between Renaud Directions.

and Grand Veisit islands, and the same mill nearly touching the N. point of Renaud island.

Anchorage.

The anchorage is good, the depth being from $7\frac{1}{2}$ to $8\frac{1}{2}$ fathoms, over gravel and sand. The strength of the currents never exceeds 4 knots, even at springs.

Caution.

The courses given are those to be followed at slack water. During the flood-tide several precautions would have to be taken. After passing Port Navalo, if the course were kept for Mouton beacon until 1 cable from it, the ship would be set right on it when endeavoring to come to port. To prevent that, when abreast Le Faucheur steer for Grogan tower, with the bath-houses of Port Navalo astern barely on with the northern point of Port Navalo bay, and starboard hard when the Mouton beacon approaches Motenno point. The ship will fly round very quickly then, the current catching the stern.

During the ebb-tide there is less difficulty, the only precaution necessary being to come quite close to Mouton beacon.

It was directed above to bring Badène steeple over the eastern part of Petit Veisit island, to enter the channel, but vessels coming in through La Teignouse pass would not have to head off to the eastward to make the alignment immediately. To remain in 5 fathoms water, it would only be necessary to keep Arzon steeple on with Le Petit Mont, twice its own width from the north point, until the former alignment is made.

**Direct course
to Lomariaker.**

Vessels of not more than 16 feet draught can make a more direct course for Lomariaker than the one given above. Bring Badène steeple over the middle of Le Petit Veisit, and steer for it until past Port Navalo bay. Then port the helm 1 point to give a wider berth to Goemorent point, and afterward steer for Kerhern mill a little outside of Le Grand Harnic, between it and the red beacon of Bler.

**Port Navalo
anchorage.**

Pilots sometimes take vessel bound in quite close to Port Navalo point, but in case of sailing-vessels it is dangerous to do so with east or SE. winds, for fear of being becalmed under that lee. The advantage consists in being out of the strength of the current. With the ebb-tide, it is perhaps best to stand in well to the northwestward of the bay, and afterward cut across as quickly as possible.

Small vessels can beat about among the numerous rocks and shoal patches off the entrance to Le Morbihan and the adjacent coast, and can shorten distances considerably; but for vessels drawing over 12 feet, the channel described above is alone practicable.

No vessel should attempt to beat up without a pilot.

None but small coasters can enter Saint-Philibert river, Saint-Philibert river. and, having no commerce, it possesses no interest for mariners.

Vessels can anchor in the Crac'h river in $16\frac{1}{2}$ to 23 feet Crac'h river. of water; 17 feet can be taken over the bar at low water.

To enter the river, with a free wind, steer for the two Directions. lights in line, N. 12° W., until 200 yards from the point on which is the light-house, when starboard the helm and follow the line of buoys, leaving them all to port, except that of Le Dahl, the last one. With the wind from the westward, steer for the upper light-tower open to the westward of the lower, and over the old guard-house. This range leads well to windward of the Basse de Mousker.

At night come in on the alignment of the lights, and anchor soon after leaving it, using the lead as a guide. At night.

Vessels drawing over 15 feet should come to below Le Dahl buoy. Above it the depths vary from 10 to 23 feet. Every vessel should moor. Anchorage.

The harbor of Port-Haliguen dries at low water; coasters Port-Haliguen. sometimes enter it to ground.

CHAPTER X.

QUIBERON PENINSULA TO PENMARC'H POINT.

Variation in 1876.—Ile de Groix, $19^{\circ} 45'$ W.

West coast of
Quiberon penin-
sula.

The west coast of the peninsula of Quiberon is bold and cliffy, and terminates in Beg-en-Aud, the NW. point. There are no distinctive marks on the coast, nor are there any outlying dangers.

Port Maria.

The little bay of Port Maria is just to the eastward of Beg-er-Lan, the southern extremity of the peninsula, and is recognizable from the offing by the steeple of Loc-Maria to the northward. The entrance to the port has been made easy by the erection of two towers, one red and one black, on Basse Plate and Men-er-Moroch, respectively. Coming from the northward in good weather, the point of rocks off Beg-er-Lan may be passed with La Teignouse light over Saint-Clément shoal, on which the sea is always breaking. If a rough sea be running, a vessel should not go inshore of the range of the black tower of Le Four (350 yards south of Saint-Clément shoal) on with La Teignouse. The port is afterward entered with Loc-Maria steeple, N. 26° E., between the two towers mentioned above.

Life-boat.

There is a life-boat at Port Maria.

There is a warping-buoy, 110 yards from the red tower, in the direction of the jetty.

Semaphore.

To the northward of Beg-er-Lan is a signal station, with yellow dwelling. Geographical number, B. G. P. L.

Port Guen.

In Port Guen, one-half mile to the southward of Beg-en-Aud, vessels anchor when unable to beat against the fresh easterly winds. The best place to come-to is in the northern part of the bay, near the shore.

Fort Pen-
thièvre.

On the narrow neck of the isthmus connecting the peninsula with the main-land, is Pen-
thièvre fort, $1\frac{1}{5}$ miles N. 50° E., from Beg-en-Aud. It is sometimes used as a landmark.

Coast.

From Beg-en-Aud point the coast begins to be generally low, with numerous sand-downs, and is lined by an exten-

sive beach, off which, in several places, are shoals, extending some distance to seaward. The shore makes a curve to the northwestward and westward, about 14 miles in length, forming a very wide bay, the NW. extremity of which is the Pointe de Gavre, on the SE. side of the entrance to Lorient.

Good landmarks, along here, are the steeples of Carnac, Plouharnel, Ardevenne, and Plouhinec. Landmarks.

Teviec island is one of a number of rocks and shoals lying off the coast to the northward of Beg-en-Aud point. The centre of the island is $1\frac{1}{2}$ miles NW. by W. from Penthievre fort. Ile Teviec.

There is anchorage inshore of Teviec island, in $2\frac{1}{2}$ to $3\frac{1}{4}$ fathoms water, with good holding-ground. Anchorage.

To reach it, coming from the westward, with a free wind, being north of the parallel of the island, steer for Carnac steeple, N. 76° E., open a little to the northward of the high rock of Men Toul. Pass 100 yards from the latter, and bring by the wind on the starboard tack, anchoring $1\frac{1}{2}$ cables inshore of Teviec island, in $3\frac{1}{4}$ fathoms water. Coming from westward.

There are several channels by which vessels coming up from the southwestward can reach the anchorage. One is to the northward of An Auter shoal, and is entered with Carnac steeple, N. 60° E., open to the right of Guernic island, rounding the latter at 350 yards, and anchoring when it opens from Teviec island. Coming from southwestward.

Or An Auter shoal may be passed to the northward, steering for Plouharnel steeple, N. 37° E., a little open to the right of Guernic island.

The other passes are hardly practicable for vessels of any size.

At $5\frac{3}{4}$ miles N. 15° W. from Beg en Aud point is the Pointe d'Ardevenne, which projects but slightly from the general line of the beach, but off which rocky ledges extend one-half mile to the westward. At 1 to $1\frac{1}{2}$ miles, between south and SW. by S. from it, are shoals and rocks also, the principal of which, called Rohelian, shows above high water. Ardevenne point.

On the range of Ardevenne steeple and Rohellian rock, $\frac{3}{4}$ to $1\frac{2}{3}$ miles from the latter, are a group of shoals called Les Pierres Noires. Penthievre fort in line with Teviec Les Pierres Noires.

islet leads to the southward of them, and Rohellan on with Etel village leads east of them.

Anchorage.

Vessels can anchor anywhere off this portion of the coast, during the prevalence of easterly winds. A lee can also be found from westerly breezes under Rohellan in $3\frac{1}{4}$ fathoms water, over sand. To make the latter, steer for Ardevenne steeple open 1 point to the northward of Rohellan, pass about 225 yards from the latter, and come to 100 yards east of it.

Etel river.

Etel river empties into the sea a little more than half way from Beg-en-Aud point to Pointe de Gavre. In it is deep water, but on the bar, which is constantly shifting somewhat, the depth varies from 2 to 3 feet at low water.

Life-boat.

A life-boat is stationed here.

Etel light:
Lat. $47^{\circ} 38' 43''$
N.; long. $3^{\circ} 12' 38''$ W.

At the entrance to Etel river, on the right bank, is a *fixed red*, dioptric, fourth-order light, elevated 40 feet above sea-level, visible 7 miles, exhibited from an iron tower.

Directions.

The bar of the river is rarely practicable during the winter season. Strong winds from SW. always make changes in the channel, which are only indicated by breakers. Under ordinary circumstances the entrance is approached with Le Sac mill open to the southward of the light, heading a little more to the southeastward to cross the bar. That done, give a good berth to the point on which is the light, and then skirt the NW. shore to avoid the middle bank, which does not shift.

Anchorage.

Abreast the village is good holding-ground at $3\frac{3}{4}$ to 5 fathoms, but the river is too narrow to berth large vessels. There are good depths also above the village as far as the bridge.

Currents.

The current of the ebb, in the river, attains a speed of 5 knots, and during freshets the flood-tide does not flow at all.

Roches de Magoëro.

At 2 miles NW. by W. $\frac{1}{2}$ W. from the mouth of Etel river, one-half mile off shore, are the Roches de Magoëro, which protrude nearly 20 feet above low-water level. Opposite them on the coast is a signal-station.

Tidal currents between Lorient and Belle-Ile.

The tidal currents between Belle-Ile and Lorient are somewhat influenced by Quiberon bay. Along the coast to Penthievre fort, 2 miles from shore, the early flood runs N., bearing full on the coast afterward. Farther off shore the

direction of the half-flood is ENE. and the speed 1 knot ; at high water there is a feeble current for a little while to the southeastward, turning, as the ebb begins to make, to SW. off Etel river, and WNW. in Belle-Ile channel, with a strength of 2 knots at springs. At low water the set is NW., and it is slack water 1 hour later. The winds influence the surface currents considerably ; if the breeze be fresh from E. or SE., the current of the ebb makes all day with a strength of $2\frac{1}{2}$ knots. There is a difference of three-fourths of an hour in the times of the rotations near shore and 8 miles off. Vessels beating to the southeastward with the flood-tide should keep rather well inshore, and anchor during the ebb-tide, as not only would the sea be bad, but nothing would be made against it.

The general northwesterly current frequently mentioned early in this work is also felt off shore.

L'Ile de Groix lies 3 miles to the southward of the coast to the westward of Port-Louis. It is a little over 4 miles in length WNW. and ESE., with a breadth not exceeding $1\frac{1}{2}$ miles. It is quite high, consisting essentially of a plateau some 150 feet above the sea. The island affords no port of refuge ; some few of its bays have been protected by jetties, but the greater part of these dry at low water, and the necessity of being so constantly at sea in bad weather accounts for the seamen being reckoned among the best on the French coast.

Ile de Groix.

The shores are bold and free from dangers except off the SE. extremity, the Pointe des Chats, south of which is the plateau of the same name, forbidding a nearer approach than 1 mile.

Pointe des Chats.

The Basse des Chats is situated outside this plateau. It is a dangerous spot from the strength of the currents, particularly during the ebb-tide. The steeple of Lorient in line with La Peyrière light-tower a little to the left of Port-Louis citadel, N. $8^{\circ} 30'$ E., leads at a safe distance E. of it. A vessel can pass with plenty of water between the shoal and the plateau, with Lorient signal-tower open of Port-Louis citadel ; it would be best not to attempt it except in smooth weather, as at other times the breakers join those of the coast. At night a vessel should not come to the

Basse des Chats.

westward of the range of the lights of Lorient church and La Peyrière.

Basse du Guihel. The depths over the Basse du Guihel are but slightly inferior to those adjacent, but the sea is sometimes heavier on it than elsewhere. Port-Louis citadel in line with Gavre point leads to the westward of it.

Pointe de la Croix. A short mile to the northward of Les Chats point is the Pointe de la Croix, the eastern extreme of the island. On it are a fort and a light.

La Croix light: The light is *fixed white* with a *red flash* every 3 minutes. Lat. $47^{\circ} 38' 03''$ N.; long. $3^{\circ} 25' 11''$ W. It is exhibited at an elevation of 171 feet above sea-level, from a square tower 39 feet high, with dwelling attached, and is visible 10 miles. The illuminating apparatus is dioptric, of the fourth order. The *flashes* are preceded and followed by short eclipses.

Life-boat. There is a life-boat stationed at the point.

The north coast of the island is frequently, but not deeply, indented. Off point du Spernec, 1 mile NW. by W. from La Croix point, are a number of little shoals, none of which extend one-fourth of a mile out.

Pointe du Grognon. The northern extreme of the island is Le Grognon point, and 1 mile N. by E. of it is the Basse du Grognon, covered by 6 fathoms. There is a semaphore on the point, 330 yards to the westward of a redoubt, with yellow building. Geographical number, B. R. S. M.

Semaphore. Pen Men point is the NW. cape, and is very bold, so that a vessel may come within 450 yards of it in smooth weather without danger; but in heavy weather a bad sea is found

Pen Men point. between it and the Basse de Groix, an $8\frac{1}{4}$ -fathom shoal $2\frac{1}{2}$ miles to the W. by N.

Basse de Groix. The Basse Busick is a $6\frac{1}{2}$ -fathom shoal 830 yards west of the coast abreast the light.

Basse Busick. At 550 yards SE. by S. from Pen Men point, one-third of a mile from the west coast of the island, is a square tower 75 feet high, with enlarged base or patten, showing, at an elevation of 194 feet above sea-level, a *fixed white*, dioptric, first-order light, visible 18 miles. This will be designated as Ile de Groix light, in referring to it.

Ile de Groix light: Lat. $47^{\circ} 38' 55''$ N.; long. $3^{\circ} 30' 41''$ W. At Nosterven, in the SW. angle of an old redoubt south of this light, is a semaphore signal station, with yellow dwelling attached. Geographical number, B. R. S. M.

Semaphore.

On the southern shore of the island the principal headlands are the Pointe Saint-Nicolas and the Pointe d'Enfer.

With west or SW. winds ships can anchor to the eastward of the island; but should the wind haul to the WNW. the swell soon becomes very heavy, and it is frequently necessary to run for Quiberon bay or Lorient. The best ranges for coming to are Ile de Groix light-tower over the semaphore in the NW. part of the island, and Tudy steeple between Port Lay and Port Tudy, (S. $\frac{1}{2}$ W.) The bottom there is sand at 11 fathoms.

Anchorage.

In good weather in the day-time it is simple work to reach the anchorage, merely doubling Pen Men point at two cables' distance. In heavy weather pass outside of Basse de Groix, with Ploemeur steeple, (several miles inshore on the main-land,) bearing NE. $\frac{3}{4}$ E.

Directions.

At night, in fine weather, steer for Ile de Groix light, and Pen Men point will easily be seen. Double it and anchor with the light bearing S. 79° W., La Croix light S. 43° E., Port Louis lights open 1° of each other, and La Peyrière light open 4° to the eastward of that of Lorient church.

At night.

In bad weather it would be advisable to double the east end of the island with the two last-named lights in line, not coming to the westward until La Croix light bears SW. Ile de Groix light should not be let bear to the westward of S. 86° W. until the Port Louis lights are within one degree of each other.

Should a vessel be obliged to double the west end of the island, she should pass, as nearly as could be estimated, 3 miles (not less than that) to the westward of the light.

Off l'Ile de Groix the directions of the tidal currents change with the hands of a watch. At low water the set is WNW., with a speed of half a knot at springs. After two hours of flood it runs NNW. and has the minimum strength half an hour later. At high water the current runs half a knot to the SSE. Two hours after it runs south, turning to SSW. at half-ebb, and increasing in velocity until low water, when it attains its maximum. Nearer the coast the speed diminishes, and the rotation precedes that in the offing by one or two hours.

Currents.

Between Gavre point, on which are a signal and a life-saving station, and the Fort de Loqueltas, which is $1\frac{1}{2}$ miles

Port Louis bay.

N. 50° W. from it, is the entrance to Port Louis and Lorient. This arm of the sea extends to the northward, and receives the waters of the Blavet and Pont-Scorff rivers. It is commonly called Lorient roadstead or Port Louis bay. The shores are very much cut up by bays, which dry at low water, and several islands and shoals make the navigation a little difficult.

The dwelling of the signal-station on Gavre point is painted yellow. Geographical number B. G. P. K.

Port Louis.

On the eastern shore, $1\frac{1}{6}$ miles to the northward of Pointe de Gavre, is the town of Port Louis, on the N. side of the mouth of the shallow bay of Kerbel. On a point to the westward of the town is the citadel, the angles of which are frequently used in making ranges. Abreast it the channel is very narrow.

To the southward of the town it is very foul ground; among the numerous rocks, La Potée de Beurre is the largest, and, being on the edge of the channel, is marked by a red tower. Le Pain de Sucre reef, between the latter and the citadel, is also marked by an iron beacon, painted in black and white bands, with a can at the top.

Port Louis
light: Lat. $47^{\circ} 42'$
 $13''$ N.; long. 3°
 $21' 12''$ W.

At Port Louis, on the S. bastion of the fortification on the N. shore of the mouth of Kerbel bay, is a small building, 10 feet high, showing a *fixed white*, catoptric, fourth-order light, elevated 20 feet above sea-level.

Kerbel light.

North $60^{\circ} 30'$ E., 1,827 yards from it, is a *similar* light, elevated 62 feet above sea-level, shown from a tower 50 feet high.

Both lights are visible 12 miles, through an arc of 15° on each side of the line of direction. In line, they lead through the western channel.

Above the town and citadel of Port Louis there is a wide shallow bay, terminating in l'Ile Sainte-Catherine, which is fortified and lies abreast of Lomikelique, with which it is connected by a bridge. The Pointe de Kerso projects from the shore at about the middle of this bay, and off it is the bank of the same name. This latter is buoyed on the outer edge, and is no great impediment to navigation. From Sainte-Catherine island the shoal water extends to the northward, and at three-fourths mile trends to the eastward from Pen

Mané Fort, off which it is of very slight extent, forming the southern bank of the Blavet.

This latter river joins that of Pont-Scorff at the head of the bay, $3\frac{1}{2}$ miles above Gavre point, and on the left bank of the latter, one-half mile from the junction, is the town of Lorient.

In the town of Lorient, exhibited from a square church-tower, 115 feet high, is a *fixed white*, catoptric, fourth-order light, elevated 148 feet above sea-level, visible 12 miles. Lorient light:
Lat. $47^{\circ} 44' 53''$
N.; long. $3^{\circ} 21' 37''$ W.

On La Peyrière mound, in an inlet on the W. side of the bay, 1,960 yards S. $8^{\circ} 30'$ W. from Lorient steeple, is a square tower, 26 feet high, with dwelling attached, exhibiting a *similar* light, visible also 12 miles, from an elevation of 75 feet. La Peyrière
light: Lat. $47^{\circ} 43' 53''$ N.; long. $3^{\circ} 21' 50''$ W.

These lights in line lead through the Passe de Gavre.

On an eminence in the southern part of the town is a signal-tower, from which vessels can be seen 30 miles to seaward. It is also used in ranges. Signal-tower.

There is a small *red* light, visible 5 miles, exhibited from a small wooden tower on the end of the jetty on the S. side of the approach to the wet-dock. Dock-light.

Just below the Peyrière light, in the middle of the estuary, is an extensive bank, capped by Saint-Michel island, which is about 450 yards long. It is the lazaretto of Lorient. The entire bank is buoyed on all sides, which, in addition to easily made ranges, makes the navigation far from intricate. Ile Saint-Michel.

Abreast of Saint-Michel island, on the right bank of the bay, is a large shallow inlet, through which is the channel of the small river Ter. The first prominent point below it is Kernebel, which is fortified. The shoal water does not extend very far out from it, and the edge of the channel is buoyed. West shore of
Lorient bay.

To the southward of Kernebel is another range of shoal water, fringed by rocks, the principal of which, La Jument, opposite Port Louis citadel, is marked by a black tower.

The same foul ground continues to the fort of Loqueltas, which is on the western point of the entrance to the bay, and immediately in front of which projects a large rocky ledge, called Les Saisies, marked by Kaléri beacon.

To the southward of Loqueltas, and to the westward

of Gavre point, is a plateau, crowned by several groups of rocks, called Les Truies, Les Errants, Le Cheval, and Les Trois Pierres. The entire plateau is 1,650 yards in extent NE. and SW., with deep water on all sides. On the westernmost rock of Les Truies group is a red tower, marking the SW. point of the bank. Les Trois Pierres are the farthest up stream, and are marked by a buoy. There is a beacon on Les Errants.

Les Bastresses. Off Gavre point are two other shoals, close together, called Les Bastresses. A large red buoy, off the western edge, marks the limit of deep water on that side. There is also a channel between them and Gavre point.

Banc des Truies. Southwest from Les Truies rocks is the Banc des Truies, 1,000 yards in length, east and west; it is the outermost shoal of the entrance to the bay, and the depth over it, in some places, is only two fathoms. Being directly between Les Truies and Groix island, it is out of steamers' direct route, whether they pass to the eastward or the westward of the latter.

Coast From Loqueltas fort the coast trends nearly west, $2\frac{1}{2}$ miles to the Pointe du Talut, and is fringed by rocks and shoals, extending, in some places, three-fourths of a mile to the southward. It is indented by two bays, l'Anse de Kerguelen and l'Anse de Stole, separated by the plateau of Kerpape. The former hardly deserves the name of bay, the inward curve of the shore being very slight. The latter runs much farther in.

Pointe du Talut. The Pointe du Talut is very bold, depths of 9 fathoms being found at 450 yards from the cliff. Vessels have little to gain, however, by passing so close to it, having to head out to clear Les Trois Pierres.

Basse de la Paille. The Basse de la Paille is separate from the foul ground bordering this part of the coast. It is 1,450 yards off the middle of Kerguelen bay, and has two heads, over one of which is a depth of only $3\frac{1}{4}$ feet at low water. Its marks are the tower on Pierre d'Orge, in line with the trees near the citadel of Port Louis, and Ploemeur steeple in the NNW., near the end of some woods.

Grazu rock. Grazu rock is quite large, and the black tower on it helps to make it easy to see and avoid. It is 1,030 yards south of

the point separating Kerguelen and Stole bays. It extends about 3 cables to the SSE. of the tower.

About 900 yards west from Grazu tower are three shoals, ^{Les Trois Pierres.} covered by $4\frac{1}{2}$ to $6\frac{1}{2}$ feet of water, called Les Trois Pierres. To avoid them Grazu tower should not be opened to the eastward of the fortifications in the southern part of Port Louis, when less than one-half mile to the westward of the former.

It is high water, full and change, at Port Louis at 3^h 11^m. ^{Tides.} Ordinary springs rise $14\frac{1}{5}$ feet, neaps $10\frac{1}{3}$ feet. Mean neap range 6 feet.

The current of the ebb leaving Lorient roadstead is very ^{Tidal currents in the bay.} powerful, attaining a speed of 5 knots at springs when there is a freshet in the rivers falling into it. It follows the direction of the main channels, bearing full on Port Louis citadel, and being then deflected toward La Jument and La Potée de Beurre. Near the entrance to the bay it sets on Les Bastresses, but at half-ebb, being influenced by the movement outside, it runs on Les Errants. In the western channel, the early ebb sets on Les Truies and Le Cheval, but afterward follows the channel.

The current of the flood begins at north, turning to the northeastward, and so on, to the right, to south for the ebb.

In the winter season, after heavy rains, there may be a ^{Caution.} steady surface current running out abreast La Jument, but in the deepest part of the channel an undercurrent will be making up, during the flood-tide, and might interfere with the good working of vessels of great draught.

L'Ile de Groix being at the inner angle of the triangle ^{Approaching Ile de Groix.} formed with Les Glénans and Belle-Ile, will rarely be the first land made in clear weather. Vessels should not attempt to approach the island on its parallel ($47^{\circ} 38' N.$) either by night or by day, unless the position be very certain, or unless the weather be clear enough to get bearings of Penmarc'h, Penfret, or Ile de Groix lights from far enough to seaward to clear La Jument rock, the southernmost of the Iles de Glénan, and $8\frac{1}{2}$ miles south of the parallel of the former light. Even under very favorable circumstances it would not be a prudent course, as it leads only about 1 mile to the southward of that rock, and the speed of the general northwesterly current is sometimes 2 knots.

A very safe course to make for Ile de Groix is N. 70° E., or more to the northward. Vessels coming from the southward have nothing to fear, as Belle-Ile is the safest possible landfall to make, and as the general current is northwesterly the position would have to be very much out to strike to the eastward of it.

Soundings. A line of accurate soundings extends to S. 70° W. of Groix island, and the distance off on that course can be found from the depth. A vessel in 82 fathoms over gray sand and broken shells is 78 miles from the light. Muddy sand will be found at 63 miles distance, and mud alone at 62 fathoms, 42 miles off. Depths of 55 fathoms will be found at 24 miles. At night the *revolving* light of Penmarc'h and the *fixed* and *flash* light of Penfret will have been made before reaching the latter depths.

Caution. Should rocky bottom be found before making either of these lights, the ship's head should be laid to the southeastward. Should this bottom be on the edge of Les Glénans plateau, that course would lead to the muddy deeps off Ile de Groix. If the rocky bottom be found on the southern border of the deeps, there would be no danger in standing on on that course until in 33 fathoms over rock, and there would be every likelihood, save in very thick weather, of making either Belle-Ile light or one of those on Groix island.

Caution. In case of SE. winds, allowance must be made for a WNW. current running 1 knot during the flood-tide, and 2 knots during the ebb. With a breeze from seaward the westerly set will not be felt; the rotation will be such as previously described.

Landfall. There is not often any uncertainty as to the land made here. Coming from the westward, and too far south to sight Penmarc'h point, either Groix island or Belle-Ile or both may be made. The former will be recognized by its being smaller and having a square light-tower in the northern part, in place of the tall, round one in the southern part of the larger island.

At night. It should be remarked that at night, except in foggy weather, vessels coming from the southward will perceive Belle-Ile light, which *revolves* every *minute*, before Ile de Groix light can be seen; and that in approaching Ile de

Groix, the *flashing* light on its eastern point will be seen shortly after the one on Pen Men point. In like manner, vessels approaching from the westward will not be exposed to the risk of mistaking the lights; for, before Ile de Groix light will be visible, they will almost always have seen Penmare'h point light, which *revolves* every *half minute*, and also Penfret island *fixed* and *flashing* light.

Vessels bound for Lorient pass to the northward or southward of l'Ile de Groix, according to the landfall. In the former case in smooth weather, the island may be approached boldly, but if there be much swell on, it is best to keep 3 miles from the west point, outside the Basse de Groix, to avoid the heavy sea. To double the eastern point bring La Peyrière light-tower and Lorient steeple in line, and keep them so.

There are several passes leading into Port Louis or Lorient bay, of which the widest and most frequently used is the Passe de l'Ouest, which has a least depth of $3\frac{1}{6}$ fathoms at low water springs.

The western pass is on the range of Port Louis and Kerbel lights, N. $60^{\circ} 30'$ E., which alignment strikes the western part of Ile de Groix near the semaphore. In day-time the hut from which the lower light is exhibited not being visible very far, a vessel may steer for Kerbel light-tower with this semaphore astern, making the true alignment afterward. The bastion on which that tower is situated is quite distinct, and its angle gives approximately the same range.

When Lorient steeple bears N. $8^{\circ} 30'$ E., in line with La Peyrière light-tower, starboard the helm and keep the alignment until beyond Port Louis citadel.

If intending to anchor in Port Louis roads, port the helm $2\frac{1}{2}$ points after passing the red buoy near the citadel, and come-to in $7\frac{3}{4}$ fathoms water, mud bottom, at 200 to 700 yards from the citadel, with Lorient signal-tower over the western extreme of Saint-Michel island. The red buoy is 100 yards above the north bastion, in $13\frac{1}{2}$ feet of water.

Vessels of lighter draught can anchor closer to the east bank, in $3\frac{1}{4}$ fathoms water, with Port Louis steeple over the easternmost of the trees east of the citadel, and Larmor

steeple over the NW. angle of the citadel. The bottom is mud, and the shelter excellent.

At night.

Entering the western pass at night is very easy, using the same range as in the day. Port Louis light will be seen at the water's edge. Lorient and La Peyrière lights have come in line, steer for them. The night is scarcely ever so dark as to prevent seeing the fortress; when 150 yards above the northern bastion, port the helm and anchor.

Beating in.

With the flood-tide in their favor, vessels can beat in through the western pass, against a dead head wind; for a large vessel, however, the boards would be rather short.

Up to abreast of La Paix tower, (*black*,) depths of $14\frac{1}{2}$ feet at low water are kept in making 760-yard stretches. The ranges on which to go about are, on the north side, the red tower of La Potée de Beurre on with Port Louis steeple, N. $59^{\circ} 30'$ E., and on the south side, Kerbel light slightly open to the southward of the fortifications.

Basse du Chenal.

Between these ranges is the Basse du Chenal, covered by only 12 feet at low water. It is a very little to the SW. of the line between the towers of Les Truies and Pierre d'Orge, 490 yards from the latter. Should a captain see that the vessel will pass near it on the starboard tack, he should go about when the westernmost mill of Lomikelique (1 mile above the citadel) touches and begins to open from the north angle of the citadel.

If to the northwestward of the shoal and approaching it on the port tack, either go off a little and keep to the southward of the line between the two towers until half-way across, or go about when the black beacon of Les Saisies touches the west angle of Port Louis citadel, and make a short stretch to the northward.

When abreast of Larmor, the boards may be extended to the northward to bring La Jument tower on with the middle of Saint-Michel island. In the eastward stand by to go in stays the minute Lorient steeple comes in range beyond La Peyrière light-tower, and beat up between these two last ranges.

The narrowest part of the channel is abreast La Jument, the width being only 275 yards. There is no room there for missing stays. The boards must be made equally on each side of the alignment given.

Vessels drawing $16\frac{1}{2}$ feet of water can beat up the western pass on the alignment of Port Louis and Kerbel lights; but they would have to make short stretches. If the wind be in the east they would do better to work up to windward outside and come in through the southern pass.

This pass, which is frequently called the *Passe de Gavre*, Southern pass. has a depth of $17\frac{1}{3}$ feet at low water. By night or by day, steer on the alignment of Lorient and La Peyrière lights. This range can be taken to the southward of Ile de Groix, leading clear of the Basse des Chats and up to Port Louis roads.

When abreast of Gavre point care must be taken that the ship is not set on Les Errants, if the ebb be running. Caution.

The channel is not wide enough to admit of beating, one of the shoals of Les Errants being left only 100 yards to port.

Strangely enough, the SE. pass seems to be not well known by the pilots, although there is a depth of $15\frac{1}{2}$ feet at low water, with a least width of 130 yards. It saves a little distance for a vessel coming from the southeastward. Southeast pass.

To enter it, bring Larmor mill N. 25° W. over the third of four store-houses on the beach, or open to the northward of the large building known as Larmor factory, adjoining them. On making the alignment of Lorient and La Peyrière lights, port the helm and keep it. Directions.

The range given would lead rather too close to Gavre point for a vessel coming in with a SW. wind. It would be better to keep Larmor mill touching the factory until the beacon on Les Errants is nearly on with Les Truies tower. Caution.

There are no night-ranges for this pass.

In Kerbel or Lomalo bay is anchorage in 13 to $16\frac{1}{2}$ feet of water, mud bottom, but a $5\frac{3}{4}$ -foot bar has to be crossed. Springs rising 14 feet, vessels can enter of greater draught than could remain inside at low water. Kerbel bay.

To enter, keep Kerbel mill on with Kerbel light until abreast of Gavre beacon, when port the helm to pass midway between the red and the black towers of Belorç'h, coming to finally 200 yards from the northern shore. The anchorage is well sheltered, but has the disadvantage of tidal currents running sometimes 4 knots. Directions.

To reach Lorient anchorage.

There are two channels leading to Lorient, one to the eastward and one to the westward of Saint-Michel island.

Passage west of Saint-Michel island.

The latter is completely buoyed, so that either a steamer or a sailing-vessel could go up without a pilot, were it not compulsory to take one in all French ports.

Directions.

Leaving Port Louis roadstead, or coming up between La Jument and the citadel, make the alignment of the flag staff, to the westward of La Peyrière, and a house on Kerman point, N. 12° W. This course leads up to abreast the little stream of Kernebel, with nothing less than 19 feet of water.

Shoal.

There is a somewhat dangerous shoal only 55 yards to the northeastward of this range, called the Roche de Kernebel. Being to the eastward of the range leading up from the lower bay, it is only to be feared by vessels leaving Port Louis roadstead. It is covered by $7\frac{3}{4}$ feet at low water, and is marked by a red buoy on the northern edge. To avoid it, be careful not to drift 50 yards to the northeastward of the alignment of the mill and the house.

As Kerbel light approaches Kerso point, while on the course N. 12° W. port the helm and steer N. 30° E., with Larmor steeple astern, between the beacon of Kernebel and a house to the eastward of it. The pilots use another range, which has the advantage of being ahead, viz: a large poplar between the *plank* and beacon of Les Sœurs. The plank is a rectangular post inshore of the beacon, with a square aperture near the top. If this latter range be used, port the helm a little, when abreast the N. end of Saint-Michel island, to pass 100 yards from the beacon.

If bound up to the port of Lorient, as far as the wet-dock, make the range astern of Pengarne tower, (550 yards above Saint-Michel island,) touching the eastern extreme of Saint-Michel island.

Proposed lights.

There is under consideration the establishment of a set of leading-lights up to Lorient anchorage. At present it is impossible to ascend the channel at night without sending boats out to make fast to some of the buoys and show lights.

Passage east of Saint-Michel island.

To enter the channel to the eastward of Saint-Michel island, steer for the signal-tower of Lorient on with the W. end of Saint Michel island until on the line between fort Sainte-Catherine and Le Cochon beacon, when steer N. 49°

E. for the former, with the latter astern, passing l'Aneno buoy to port. When 250 yards from the fort, steer due N., and afterward pass to the southward of Pengarne tower, with the little bridge connecting the fort with the mainland astern under some scattered trees. Pengarne tower passed, make the ranges given for the western channel.

The least water in this channel is 3 fathoms.

Large vessels generally anchor in $3\frac{1}{2}$ to 5 fathoms water, at the confluence of the Blavet and Pont-Scorf, or make fast to the buoys there. The greatest depths are in a channel running NE. and SW. abreast of, and 225 yards from, Pen Mané point. The eastern limit of this channel is on the range of the pier-head light and the SE. angle of the infantry barracks, and the western with Ile Saint-Michel open to the westward of Port Louis citadel. Larmor mill on with La Peyrière point gives the middle of it.

Anchorage.

A depth of 5 fathoms over soft mud will be found on the cross-bearings of Larmor steeple over the N. angle of the terrace of Kernebel factory, one-fourth of a point outside Saint-Michel island, and the pier-head light of Lorient dock a half-point to the eastward of the infantry barracks.

The bottom throughout here is mud, and the anchors hold well anywhere, but it is forbidden to remain between the lines of buoys, as it would interfere with the movements of the large men-of-war.

Caution.

There is a wet-dock just below Lorient, for merchant shipping; the floor is on the level of low-water springs, so that $16\frac{1}{2}$ feet is the greatest draught that can ever enter, the tide, swelled by freshets, rising that amount at times there. The gates are opened at high water only. Vessels arriving off the end of the jetty haul in, assisted by sail if the wind permit. They can also moor to the pier and ground in the mud at every tide.

Wet-dock.

The Port Militaire is in the Pont-Scorf river, and has depths of $3\frac{3}{4}$ to 5 fathoms. There are two careening-docks, with floors 6 feet and $14\frac{3}{4}$ feet, respectively, below low-water level.

Port Militaire.

Careening-docks.

The tidal currents in the Port Militaire run $3\frac{1}{2}$ knots at springs when there is a freshet in the river. The flood-tide begins to make 20 minutes after low water.

Tidal currents.

Town of Lorient.

The origin of Lorient is due to the naval depot founded there in 1666 by the French East-India Company, and from this circumstance it took the name of Port de l'Orient. On the dissolution of the company in 1770, it was made one of the stations of the French navy and a free commercial port. It is now the first construction port in France, having building-ways capable of accommodating at once thirty first-class frigates. Most of the iron-clads of the late Imperial navy were built there. The dock-yard employs 6,000 men. There are fine masting-sheers and block-sheds, the machinery in which, as well as a portion of that used for cable-making, is worked by steam. There are also numerous machine-shops where the engines are built for the navy.

Lazaretto.

The lazaretto is on Saint-Michel island.

The port is lined with magnificent buildings. The arsenal and naval stores are extensive, and the artillery barracks are capable of accommodating 2,500 men. Lorient has also a school of naval artillery, and a spacious artillery-ground near the town, a school of hydrography established in 1771, a large well-conducted commercial college, a preparatory school for training for the government academies, gratuitous schools of drawing, geometry and arithmetic, a public and a good naval library, museums of chemistry and mineralogy, an agricultural and various educational societies. It is the seat of tribunals of primary jurisdiction and commerce, and chamber of commerce.

The town is walled off from the port, thereby excluding all view of the water from the inhabitants. It is regularly built, with straight, wide, well-paved streets, and the houses are well constructed and handsome. One of the public squares is planted with lime-trees, and there are other handsome promenades. The public slaughter-houses are remarkably clean, and the meat, fish, and bread markets are, next to those of Rennes, the best constructed and most extensive in Brittany. A railroad-bridge spans the river just above the town.

Population.

The population of Lorient in 1872 was 34,660.

Industries.

Besides ship-building, the industries include the manufacture of hats, linens, gold lace, and earthen ware.

Commerce.

The trade and commerce of Lorient, of considerable importance once, have greatly decayed. The chief exports

are brandy, wheat, wax, honey, butter, corn, cattle, and pilehards, the latter being taken up in great quantities off the adjacent coast, and sent to Nantes for preparation for export.

The town of Hennebont is on the Blavet river, about 6 miles above its confluence with the Pont-Scorf. The stream is spanned by a bridge just below the town, and vessels have to strike their light spars to pass. A scale, inverted, shows the height that can pass under the arch at the different stages of the tide. Large vessels rarely ascend to Hennebont, although some drawing $17\frac{1}{3}$ feet have been taken up. Buoys have been placed above and below the bridge to assist in hauling through. There is anchorage above it as far as the town, and below it as far as the saw-mill; between the latter and the brick-kiln it is not advisable to anchor, nor to let the anchor drag on the bottom while clubbing up or down.

Hennebont.

The trade is stimulated by the manufactures of the place and of neighboring towns. Three to four hundred vessels yearly bring Spanish iron-ore up the river, a large portion of which is transported to Redon. Several factories besides the iron-works help to create a commercial movement of some importance.

Trade.

The river channel is buoyed in the lower part, above which it is necessary simply to keep in mid-stream.

There is a life-saving station at Loumener.

Channel.

Life-saving station.

At Talut point the coast trends off to the northwestward for $3\frac{1}{4}$ miles, to Kergan fort, built on a large rock, beyond which the general direction is the same, but the nature of the shore changes, and a 2-mile sand-beach replaces the bold cliffs, and curving very slightly inward forms l'Anse du Poullu. The coast then becomes again steep-to and high with a few outlying shoals, and runs 13 miles W. by N. to the Pointe de Trévignon, considerably indented by inlets and the mouths of the rivers Quimperlé, Bélon, and Aven.

Coast.

The tidal currents off this coast affect in a great measure a vessel's course in beating along it. During easterly weather, the current which sets without change to the westward in the offing, slackens inshore during the flood-tide; at half-flood there is even a slight easterly set at times. So a vessel beating against an easterly breeze would do well to

Tidal currents.

make short boards off shore, and anchor during the ebb, unless it be evident by marks on shore that she is making something against it.

With westerly winds the ebb sets to the westward and the flood to the eastward; but the former is much the stronger, being sustained by the general west-northwesterly current.

The early flood commences at north, and the currents turn with the hands of a watch, running longest to NW.

The turn of the tides inshore precedes that in the offing by two hours.

La Roche des
Sœurs.

The first shoal to the westward of Talut point is La Roche des Sœurs, one-third of a mile out from the general line of the coast. It is cleared by keeping the red tower of Les Truies open of Talut point.

Basse Garo.

At $2\frac{1}{4}$ miles farther on to the northwestward, is the Basse Garo, covered by $13\frac{3}{4}$ feet of water, the outermost of a number of shoals extending $1\frac{1}{2}$ miles from the coast, just to the southward of Kergan fort. The other patches are the Grand and the Petit Cochons. Outside the Basse Garo there is a 30-foot patch, which can hardly be included with the others, except that the change of depth is so abrupt, from 13 to 5 fathoms, that it affects the sea on it. Saint-Modé mill, in the northward, open from a hedge near the cliff, leads well clear to the westward.

Pouldu bay.

Off l'Anse du Pouldu there is clear water, decreasing regularly in depth to the beach. There is working-room for a fleet, good holding-ground, (sand and mud,) and no difficulty in getting under way to make an offing, except with the wind at SW. About 1 mile from the beach $4\frac{1}{2}$ to $6\frac{1}{2}$ fathom depths will be found with Guidel steeple over the signal-station three-fourths of a mile to the southward of the north end of the beach, and the black tower and signal-staff at the entrance to the Quimperlé river, in line. Vessels lying there can obtain provisions in the river. Guidel fort is just back of the middle of the beach.

Quimperlé
river.

The entrance to the Quimperlé river is marked by a signal-staff on the right bank, from which piloting-signals are made to vessels when the weather is too bad to admit of boarding them. No tide-signals are made. At the highest spring-tides, $11\frac{1}{2}$ feet is the greatest draught that can enter, except during the winter season, when the river is almost

always higher. The current of the ebb at the mouth attains a speed of 6 knots at springs, and it is next to impossible to enter an hour after high water. A black tower has been built on the western point of the entrance, and should be passed to port close aboard. A black beacon farther up should likewise be passed to port at 25 yards distance.

Off the coast, from the mouth of the Quimperlé river to Douélan, there are but two shoals, one of which, the Basse du Porsac, is two-thirds of a mile off shore, covered by 15 feet of water. It is cleared by keeping Kerlagat mill (to the westward of Port de Douélan) well open to the westward of the Vache beacon, (on the left side of the entrance.) Basse Porsac.

The other shoal, the Basse an Iliss, is to the southwestward of the former, and is covered by $27\frac{1}{2}$ feet; it rarely breaks. It is cleared on either side by keeping Kerlagat mill well open from the eastern or western points of the big rock at the entrance to Port Douélan. Basse an Iliss.

The Port de Douélan is a creek at best, which can only be entered by the smaller coasters. The sardine fishery is carried on quite extensively. Port de Douélan.

On the left bank of the Port de Douélan, about 1 cable from the mouth, is a circular white tower, 33 feet high, showing a *fixed white*, dioptric, fourth-order light, 82 feet above sea-level. N. 14° E., 356 yards from it, is another white tower, of the same height, showing a *similar* light, 118 feet above sea-level. Both are visible 8 miles, and, in line, lead in. The lower light illuminates as far to the westward as the Basse Jaune. The other is screened by the heights on either side of the entrance. Douélan lights:
Lat. $47^{\circ} 46' 18''$
N.; long. $3^{\circ} 36' 37''$ W. (South light.)

Vessels can anchor outside the beacon, on the range of the lights; with west winds the sea is rather heavy there. Anchorage.

Between Douélan and Beg-Morg point, the next headland in the westward, shoal water does not extend more than one-fourth of a mile from the general line of the coast, but there are two separate shoals, about one-third of a mile off, Karek-Bras and Basse de Kercécol, on which the sea breaks in bad weather, although the depths are, respectively, 5 and $3\frac{3}{4}$ fathoms. Shoals.

There are two little inlets to the eastward of Beg-Morg point, called the Port de Brigneau and the Port de Meryen.

They are very small, but as there is no surf in the latter it is rapidly becoming a resort for fishermen.

Bélon and
Aven rivers.

From Beg-Morg point, off which are Les Cochons rocks, that uncover at low water, the coast extends $2\frac{1}{2}$ miles NW. $\frac{1}{2}$ W., to the mouth of the two small rivers, Bélon and Aven, which are both very shallow, and the bars of which dry at low water.

Aven light:
Lat. $47^{\circ} 48' 00''$
N.; long. $3^{\circ} 44' 30''$ W.

On Bec-ar-Vechen point, on the west side of the entrance to the Aven river, is a *fixed* light, with 1 *green*, 1 *red*, and 2 *white* sectors. It shows *white* when between the bearings of N. 50° E. and N. 32° W.; *red*, between the latter and N. 49° W.; *white*, again, to N. 56° W.; and, finally, *green*, from the latter bearing to the coast. The *red* sector covers the plateau of Les Cochons and Les Verrés shoals, and the *green* all the foul ground skirting the eastern shore of the bay; the *white* rays show clear of all dangers. The illuminating apparatus is dioptric, of the fourth order, and the light is visible 8 miles, exhibited, at an elevation of 125 feet, from a white stone tower 33 feet high.

Directions.

There are several beacons to assist the pilot in approaching the rivers. On the outermost of Les Verrés is a black tower, and a vessel coming from the eastward should tack to the southwestward when it comes in line with Rousbicout point, $1\frac{1}{2}$ miles SW. from the light. There are several other shoals off the entrance to the rivers, of which Le Trépied has the least water, $20\frac{1}{3}$ feet. To avoid it, keep to the southward of the alignment of Les Verrés tower with Beg-Morg point, until the light bears to the eastward of N. $\frac{1}{4}$ E. It is easy to approach at night, by observing the different colors of the light. The best course to hold for the light is N. 39° E., which clears Le Trépied.

Pointe de Trévignon.

From the mouth of the Bélon and Aven rivers the coast runs SW. and west $2\frac{2}{3}$ miles to Pointe des Raguènes, and $2\frac{1}{3}$ miles farther to the westward, to Trévignon point, on which are a fort and signal-station.

Ile Verte.

Rocks extend 1 mile to the southward of the former point, l'Ile Verte being the outermost. There is a depth of $17\frac{1}{3}$ feet inside this islet, and Les Verrés tower on with Beg-Morg point leads through in mid-channel. This range leads

Karek-bras.

to the northward of Karek-bras, which has 8 feet of water only.

Immediately south of Raguénès point is a rock of the same name, the south edge of which is one-third mile from shore. Raguénès rock.

To the WSW. 1 mile from l'Ile Verte is the rock of Men-an-tréas, which dries $4\frac{1}{4}$ feet. The NW. point of Verte islet on with Ronsbicout point leads clear to the southeastward of it and the adjacent shoal of Corn-Vas to the westward. Men-an-tréas.

Mendu is a rock, which protrudes 16 feet above low-water level, three-fourths mile NW. from Corn-Vas. Vessels can pass between the two with Les Verrés tower hidden by Verte islet. On approaching the latter steer to round it at 2 cables' distance, either to the southward or the northward. Mendu.

The Basse Jaune, 5 miles south of the Pointe de Trévignon, is one of the principal dangers in this neighborhood, particularly for vessels bound to or from Concarneau, passing to the eastward of Les Glénans. The principal head dries 1 foot at low water, and breaks in all weathers; shoal patches, including Le Pignon, extend $1\frac{1}{2}$ miles to the west northwestward. To pass to the westward keep Porzou manor in line with (N. $\frac{1}{2}$ W.) or a little to the eastward of Kériolet château. To pass to the northward of it, keep Cigogne fort (in the centre of Les Glénans) less than two-fifths way from the light to the semaphore on the island of Penfret, or Brunec island open to the northward of Penfret island. Cigogne fort in range with the semaphore leads clear to the southward. Basse Jaune.

At night Penfret light should not bear between west and N. 70° W., the former range leading north and the latter south of it. Aven light N. 28° E. shows clear in the eastward, and when hidden shows that the vessel is clear in the NW. At night.

Vessels can pass inside Le Corven de Trévignon, a $7\frac{1}{2}$ foot shoal, $1\frac{1}{3}$ miles WSW. from the point of that name, by keeping the south point of Raguénès rock slightly open to the northward of Les Verrés tower; when south of Trévignon point, make the range leading inshore of l'Ile Verte. Corven de Trévignon.

From Trévignon point the coast runs $7\frac{1}{3}$ miles NW. by N. to the head of the bay of La Forest, which is 2 miles wide, and the western shore of which extends $1\frac{5}{6}$ miles southward to the Pointe de Beg-Meil. Coast.

Pointe de la
Jument.

La Jument point is $3\frac{1}{4}$ miles from that of Trévignon; between the two are a number of rocks which forbid a nearer approach than $1\frac{1}{2}$ miles, until $1\frac{1}{2}$ miles to the north-westward of the latter point; Keriolet and Porzou manors, or Talamot mill on with the trees of Anodet, lead clear of them all, including the Corven de Trévignon.

Le Corven de
la Jument.

Off La Jument point, a little less than $1\frac{1}{2}$ miles WSW. from it, is Le Corven, a dangerous shoal, which breaks during southerly winds, although covered by 11 feet of water.

Channel in-
shore.

The passage inshore of it should not be attempted except in good weather, in which case it would be best to pass also inshore of Nouarnou shoal, two-thirds of a mile E. by S. from it. The tower on Le Cochon, slightly open to the westward of the point south of Talamot mill, clears everything to the eastward of Nouarnou and leads up to the Petit Taro rock. The rocks immediately off La Jument point are cleared by keeping the battery of Concarneau block-house just open of Cabellou point. Between these two ranges is a channel 3 cables in width.

Le Corvic.

SE. of Le Corven de la Jument is Le Corvic, with $5\frac{1}{2}$ fathoms over it; it breaks in very heavy westerly gales. Beuzec steeple on with Porzou manor leads outside of it.

Pointe du Ca-
bellou.

The next headland is the Pointe du Cabellou, $1\frac{1}{2}$ miles from La Jument point. It is distinguishable by the fort on it. Between the two is a small bay, across the entrance to which are several shoals.

Le Cochon.

At one-third mile to the west-northwestward of Cabellou point is Le Cochon, marked by a red tower, on the SE. border of the channel leading to Concarneau.

The coast here recedes to the eastward, forming a bay, the SE. corner of which is called l'Anse de Kersos; in the northern part is the port of Concarneau.

L'Anse de Ker-
sos.

A good lee can be found in Kersos bay in 12 feet of water, with Porzou manor open of the angle in the garden wall, and the cross of the chapel over the SW. wall of the reservoir.

Lanriec light:
Lat. $47^{\circ} 52' 01''$
N.; long. $3^{\circ} 54' 46''$ W.

On the east side of the entrance to Concarneau harbor is a *fixed red*, catoptric, fourth-order light, visible 9 miles, elevated 43 feet above sea-level, exhibited from the top of a house 17 feet high, painted white. It illuminates an arc

of 19° only, which clears all dangers. It disappears as the vessel approaches the shore.

At La Croix battery, on the west side of the entrance, is a *fixed white*, dioptric, fourth-order light, visible 9 miles, exhibited, at an elevation of 46 feet above sea-level, from a circular white tower 30 feet high.

La Croix light :
Lat. $47^{\circ} 52' 11''$
N. ; long. $3^{\circ} 55' 12''$ W.

NNE. $\frac{1}{2}$ E., 2,052 yards from the latter, is a *fixed white*, catoptric, fourth-order light, visible 12 miles, from an elevation of 148 feet. The tower is circular, 30 feet high, and painted white. This light is visible only 15° on each side of the line of direction with the lower light. The two in line lead into Concarneau roads.

Beuzec light.

It is high water, full and change, at Concarneau at $3^h 12^m$. Mean springs rise 13 feet, neaps $9\frac{1}{2}$ feet.

Tides.

The bay of La Forest has often served as a port of refuge for vessels caught by a gale of wind inside Penmare'h; it is perfectly sheltered from all winds save those from south or SE. If caught in there by a gale from that quarter, the heavy sea would make it almost impossible to hold on, although the bottom be mud. If unable to get out it would be best to try to guide the vessel's drift to the mouth of La Forest river, and there would be comparatively no danger in grounding there.

Baie de la Forest.

The bay is considerably frequented by small vessels that come there to dredge for a calcareous fertilizer, formed by the polyps that live in the bay and accumulate on the bottom to the thickness of an inch. The country for miles inland is manured with it.

The two small streams of La Forest and Penfoulic empty into the head of the bay. They are very shallow and are only entered by boats bringing salt for the preserving of fish, and taking away wood.

Streams.

Between La Forest bay and Les Glénans, the last of the flood-tide and the first of the ebb run SE; the last of the ebb NW., and the early flood N. To the southward of Concarneau the early ebb and the last of the flood set along the coast SE. Off Beg-Meil point, after two hours' rise, the flood sets NE. The surface-currents are considerably influenced by the direction and strength of the wind.

Tidal currents.

The plateau of Les Glénans comprises eight islets and a

Les Glénans.

number of rocks. The greatest length is $7\frac{1}{2}$ miles SE. and NW. The islets are on the northern part of it.

Landmarks.

The only landmarks in the group are Penfret light-tower, the semaphore on an eminence at the S. end of Penfret island, and Fort Cigogne on the central island.

Vessels sometimes enter the archipelago to find a lee, and occasionally to load a cargo of soda.

Anchorage.

With westerly winds a ship can come to under Penfret island, about 3 cables from the sandy bay of Castel-Raet, in $6\frac{1}{2}$ to 10 fathoms, which depths increase gradually to the eastward. The bottom is mud. Or, in case of SE. winds, which are quite frequent during the winter-season, a lee will be found in $5\frac{1}{2}$ to $6\frac{1}{2}$ fathoms, 275 yards SW. of Pen a-Men, the N. point of the island of Penfret.

Limits of the plateau.

Les Pierres Noires, to the eastward of Brunec island, always dry; Brunec, La Huic, Le Gluet, Le Run, and Men Arc'hy always showing above water, the northern side of the plateau may be boldly approached. The NW. edge is on the alignment of the farm-houses, to the left of Concarneau, on with the E. end of l'Ile aux Moutons, or Beg Meil semaphore, touching the W. end of the same. In the eastward, the limit is on the range of Men Skey rock and Penfret light. This alignment clears Les Laouenou ($5\frac{1}{2}$ fathoms) and Basse-an-Ero, which dries 1 foot at low water.

Penfret light:
Lat. $47^{\circ} 43' 17''$
N.; long. $3^{\circ} 57' 18''$ W.

On the northern part of Penfret island is a square tower, 72 feet high, with enlarged base, from which is exhibited a *white light, fixed*, with a *flash* every 4 minutes. It is a dioptric, third-order light, 118 feet above sea-level, visible 14 miles. In ordinary weather the eclipses do not appear total within 6 miles.

La Jument.

The most dangerous of all the shoals is La Jument, because of its being the southernmost, in the track of vessels bound toward Ile de Groix, and drying at low water. No good ranges can be given to clear it, as the landmarks are too far off. It is less than 3 miles from the southernmost island, but it would be prudent to give the latter a berth of 4 miles to clear everything.

Tidal currents

The tidal currents in the vicinity of Les Glénans flow to every point of the compass, beginning at N. with the last of the ebb and early flood, turning, through E., to SE. for the last of the flood, then S. and WNW.; when setting to

the latter point the speed is greatest—3 knots. The ebb is most strongly felt among the western islands of the group.

It is high water, full and change, at Les Glénans at 3^h 11^m. Mean springs rise $14\frac{1}{5}$ feet, neaps 11 feet. Tides.

Les Pourceaux comprise three clusters of small rocks, besides a few scattered ones within the triangle formed by the Grands Pourceaux, Petits Pourceaux, and Leurion groups. The $5\frac{1}{2}$ -fathom line of the bank, in the southward, is parallel to, and distant $1\frac{1}{8}$ miles from, the northern islands of Les Glénans group. Les Pourceaux.

To pass between Les Glénans and Les Pourceaux it is simply necessary to steer to the eastward, one-third to five-sixths of a mile from the northern islands of the former. The light tower over Les Pierres Noires leads clear of the Basse Rouge, SW. of l'Ile aux Moutons. That course may be held until l'Ile aux Moutons approaches Benodet lights, when head up for Concarneau. Channel north of Les Glénans.

Coming from the southwestward with the flood-tide, Beg-Meil semaphore should be kept open of the W. end of Ile aux Moutons to avoid being set on the rocks between Les Bluiniers and Men ar C'hy.

Approach from the westward at night, with Penmarc'h light astern N. 77° W., and Penfret light a little off the starboard bow. Observe when Concarneau lights come in line, after which run about 1 mile more on that same course, and steer then N. 28° E. for several miles to clear Les Pourceaux. The ship's head may afterward be laid more to the northward to make the alignment of Concarneau lights. At night.

Vessels beating through can stand on to 1 cable to the northward of Les Pierres Noires, and make five-sixths of a mile boards to the northward. Beating through.

l'Ile aux Moutons is on the SE. border of a bank $2\frac{1}{2}$ miles long NE. and SW., with a greatest breadth in the northern part of $1\frac{1}{4}$ miles. The other principal spots are Trevarec rock, which never covers, to the southwestward of Moutons island, and the Basse Rouge, which forms the SW. extremity of the plateau. The latter dries $6\frac{1}{2}$ feet at low water; it is cleared 490 yards in the SW. by the range of Benodet lights. Ile aux Moutons.

It is proposed to establish a light on Pen-an-Guern rock, NE. of l'Ile aux Moutons. Proposed light.

Channel south
of l'Ile aux Mou-
tons.

Between l'Ile aux Moutons and Les Pourceaux is a channel two-thirds of a mile wide in its narrowest part, with depths nowhere less than $6\frac{1}{2}$ fathoms. It never breaks, and is practicable in all weathers.

Directions.

In the day-time steer NE. for the E. edge of l'Ile aux Moutons, passing one-fifth of a mile from it, and keeping on one-half of a mile beyond it to clear the Pen-an-Guern and other rocks. Then head up for Le Cochon tower off Concarneau.

At night.

At night, after passing to the eastward of the meridian of the *fixed white* light of Loctudy, steer S. 77° E. with Penmarc'h light (*revolving*) astern and that of Penfret a half-point off the starboard bow, heading up to NE. when the two lights of Benodet come in line. This course will be for Moutons island, and the night would have to be very dark not to see it on drawing near; give it a berth of a half-mile.

Using sextant.

The use of a sextant, in place of a compass, is less liable to error, and will render the passage safer. On approaching the meridian of Loctudy light, having clamped the vernier of the instrument at $117^{\circ} 35'$, observe Penmarc'h and Beuzec lights, and try to come on that meridian, with them coinciding in the horizon glass. Steering S. 82° E., for Penfret light, will put the ship in that position. The coincidence perfected, maintain it, and the vessel will describe an extended arc, passing safely between l'Ile aux Moutons and Les Pourceaux. On making Concarneau lights in line steer for them.

Caution.

Penfret light should not be brought to bear to the southward of E. $\frac{1}{4}$ S., for 2 or 3 miles after sighting it. The limit of the range of visibility, on the bearing, S. 82° E., is on the Grande Basse of the Roches de Penmarc'h.

Beating
through.

To avoid the Basse Rouge, in beating into this pass, go about on the range of Lanriec steeple and the northern side of l'Ile aux Moutons. When past this shoal, to clear the next, the rocks to the southward of Trevarec, keep to the southward of the alignment of the same steeple on with the east end of Ile aux Moutons, N. 45° E. Boards of two-thirds of a mile can be safely made to the SE.; if Le Grand Pourceau be showing above water, go about before it comes in range with Trégunc steeple, NE. $\frac{1}{4}$ E. When l'Ile aux

Moutons has passed Loctudy light-tower, or Plounéour steeple, in the NW., the boards may be extended to the SE.

The channel north of l'Ile aux Moutons is practicable for almost any vessel, so far as depth is concerned, but is rather narrow.

Steer east for Moutons island, or Trevarec, and when one-half mile from the former, or one-fourth of a mile from the latter, head up to the N. 40° E., and bring Lanriec light over Le Cochon tower N. 46° E., and keep that alignment.

Vessels beating through must avoid the Basse Joubert, over which is a depth of only 10½ feet at low water, by tacking on the west side of the channel when three-fourths of a mile from l'Ile aux Moutons, after passing to the northward of its parallel. When Trevarec passes to the westward of fort Cigogne, the boards may be extended to the northwestward, but not more than 1½ miles from l'Ile aux Moutons, to avoid Treus Vas. When Kergos mansion is well on with Benodet point, (to the eastward of the lights,) a vessel may stand on to the northward clear of all these shoals.

The only marks that can be used for the channel south of Men-Diou are so far away, that it should never be taken except in very clear weather. Approach it with Beg-Meil guard-house between the semaphore and the upper farm-house, nearer to the former. This leads south of Rostolou and Men-Diou, and north of Koguès. When Kergos château has passed to the eastward of the lower light of Benodet, the latter will have been passed, and the semaphore of Beg-Meil on with the farm-house, or Beuzec light-tower one-half point open of Beg-Meil, are good ranges.

A ship can pass to the southward of Koguès by steering N. 47° E. for the semaphore on with the farm; the former can be opened 1° to the northward of the latter, without touching l'Astrolabe shoal, giving one-half mile of working room.

As soon as Najac château, on the south end of an island inside the entrance to Pont l'Abbé river, opens to the southward of Plounéour steeple, the boards may be extended to the eastward and northwestward.

The principal landmarks used for entering the harbor of Concarneau, or La Forest bay, are: the steeple of Beuzec,

Channel north
of l'Ile aux Mou-
tons.

Directions.

Beating
through.

Passage south
of Men-Diou.

Landmarks
near Concarneau.

on an eminence, but the spire of which only will appear against the sky; that of Concarneau, within the inclosure of the old town; Beuzec light, visible from Les Glénans; the semaphore on Beg-Meil point; Cabellou point and fort, and outside of it Le Cochon tower. In the eastward will also be seen the semaphore on Trévignon point.

Directions.

To enter Concarneau harbor, in clear weather, whether coming up to the eastward of Les Glénans, or through one of the channels to the northward of them, bring Beuzec steeple N. $28^{\circ} 30'$ E., which on that bearing is over Beuzec and La Croix lights. Keep this alignment until 650 yards inside the red tower of Le Cochon, which will have been passed to starboard.

Coming up between Les Glénans and Basse Jaune, with Porzou and Keriolet mansions in line, when abreast Penfret light, the ship's head may be laid N. by W. $\frac{1}{2}$ W. to make the alignment of Concarneau lights. It would be better, however, to steer NNW., to allow for the drift toward Le Corven de la Jument, if the flood-tide be making.

The least depth will be found abreast Le Cochon tower, $20\frac{1}{3}$ feet at low water. After passing it look for Le Bois mill, which will readily be distinguished to the left of Lanriec light-house. When this mill comes in line with a white, stone beacon, in the shape of a truncated triangular pyramid, on the shore, port the helm and keep the alignment, N. $55^{\circ} 30'$ E., standing on until one-half cable from the shore, when head to the northward,* keep at that distance to avoid the Basse de la Médée, and pass midway between the end of the jetty and the opposite shore. This last part of the channel can be followed by keeping Concarneau steeple open to the eastward of the salient angle of the fortifications.

Anchorage.

The least depth on these courses is 13 feet at low water. Small vessels run in and ground in the port above the jetty; but vessels of 12 or 13 feet draught can anchor to the eastward of a rocky plateau NE. from the jetty, with Beuzec light over the angle of the fortifications. Come-to

* This change in the course should be effected before the beacon of Cléo comes on with the aquarium in the northwestward, to avoid the rocks on Lanriec coast.

on this range anywhere from the alignment of the jetty-head masking the reservoir to quite near the fortress.

This anchorage has the disadvantage of $2\frac{1}{2}$ -knot currents during the ebb. South winds are also apt to start vessels dragging.

Farther up is a 13 to 16 foot hole, to reach which steer for a house, the Maison du Pont, to the right of and below Benzec light, in midstream until beyond the fortress, and come to about 85 yards from the walls of the old city. Lower anchor-
age.

When abreast the middle tower of the fortifications, let the ship yaw to starboard somewhat to avoid a reef, and return to the range given. Caution.

There being but little room to swing at low water, a kedge should be carried out astern to keep the ship's head to the northward.

In foggy weather steer with Penfret light astern S. $\frac{1}{2}$ W., as long as it can possibly be seen. This course leads not very far from Le Corven. Le Cochon tower should then be looked out for and passed 85 yards to starboard. If becalmed, the anchor may be let go 650 yards to the northward of the tower, in $4\frac{1}{3}$ fathoms, over mud. In foggy
weather.

At night keep the alignment of Benzec and La Croix lights, N. $28^{\circ} 30'$ E., until Lanriec light* bears N. 68° E., when steer for the latter until half a cable from shore. At night.

Be the night clear or dark, it would be best to anchor until daylight, a little to the westward of the alignment of the two *white* lights, with the *red* one bearing N. 65° E. The bottom here is mud and sand at 6 fathoms, and a vessel could ride out gales of wind from anywhere except between SSE. and SW.; a heavy sea is raised by winds from that quarter.

Among the first dangers to be avoided in beating is the Chaussée de Beg-Meil, which extends 1 mile to the southeastward of that point, and dries 3 feet in some places, breaking throughout in rough weather. A sufficient berth will be given it by not going to the westward of Le Cochon tower midway between Porzou Manor and Lanriec light, or Concarneau steeple over the low rock of Men Cren. A more Beating in.

* This light will be first made bearing N. 63° E., and the ship's head might be laid for it then; but this leads very close to Men Fall rocks. The light disappears on approaching the coast.

distinct range at high water than either of these is Beuzec light-tower over the scarp of the block-house. When La Forest steeple comes over the point of cape Cos, at the head of the bay, the Chaussée is passed, and the boards may be extended to the northward.

Karek-Allidec. There is a depth of 6 fathoms over Karek-Allidec, which never breaks, and which need not be avoided except in anchoring, the bottom being rocky. It is limited in the SE. by the range of the two *white* lights, and in the NW. by Beuzec steeple over Men Cren.

Basse de Guinoec. The Basse de Guinoec, the head of which is only a few square yards in extent, is covered by only $14\frac{3}{4}$ feet; the bottom in the vicinity is rocky. The SE. limit of the plateau is given by Men Cren outside the eastern extremity of Concarneau battery; the NW., by Men-Mark, (close inshore south of the redoubt,) under Beuzec steeple.

Linuen de Cabellou. The Linuen de Cabellou is a rocky shelf of small extent, covered by 21 feet of water. It rarely breaks. Beuzec steeple on with the wall surrounding the old town leads clear to the westward.

Corven de la Jument. Beuzec steeple on with the angle of Concarneau fortress, (in the inner harbor,) leads clear to the westward of Le Corven de la Jument.

Le Cochon passage. The channel abreast of Le Cochon is too narrow to admit of vessels of any size beating, being only 130 yards wide between two rocks covered by 3 and 5 feet respectively.

Concarneau roads. A vessel can anchor off Concarneau, 300 yards to the eastward of Men Cren, in 6 fathoms, or anywhere on the range of the white beacon and Le Bois mill. The depths vary from 13 to $19\frac{1}{2}$ feet to within 130 yards of the shore.

Town. The town of Concarneau stands on the island inside the harbor, and is surrounded by thick stone walls, with projecting parapet and towers at regular distances. The suburbs are more extensive than the town, and are better built. The island is 400 yards long and 120 broad. Fishing is the chief occupation. The exports of the place are cider, timber, grain, and salt fish; the imports, salt, wine, brandy, Norway deal, and empty casks. The trade is principally coastwise.

Population. The population is about 3,000.

To reach the anchorage in La Forest bay, having doubled the extremity of the rocks off Beg-Meil as directed above, steer for cape Cos at the head of the bay, open to the westward of La Forest steeple. About one-half mile on this course will put the vessel on the cross-bearing of Le Bois mill on with Concarneau point, near the light-tower, when the anchor may be let go in $5\frac{1}{2}$ to 6 fathoms water, mud bottom. To enter La Forest bay.

Another range for determining the berth is Le Cochon tower, open to the southward of Cabellou point.

From Beg-Meil point the coast runs $2\frac{3}{4}$ miles W. by S. to the Pointe de Mousterlin, making a slight inward curve near the latter. It is fringed with rocks, a continuation to the westward of the Chaussée de Beg-Meil. The southernmost are the Roches de Mousterlin, which lie $1\frac{5}{6}$ miles S. of that point. Pointe de Mousterlin.

West by S., 5 miles from Mousterlin point, is the mouth of the river Pont l'Abbé, and between the two l'Anse de Benodet extends $1\frac{1}{2}$ miles to the northward, receiving at its head the waters of the Quimper river. The shores of this bay are low, except near the mouth of the river, being composed of sand-downs. Back of these downs is higher land, including several hills that may be used in taking bearings for position. The bay affords a good lee from winds between SW. and NE., through N.; but at the entrance shoals make the navigation very intricate. Anse de Benodet.

The tidal currents act in l'Anse de Benodet in the same manner as everywhere in the vicinity, turning with the sun, or to the right. Tidal currents.

At the entrance in the southward it is much the same. At half-flood the set is N. or NE., as the vessel is more or less to the eastward. The ebb runs SW. The only slack water is in the offing, one-half hour after high water. At low water the current runs S., without any diminution in strength. In general, it may be stated that the tide enters the bay from the southeastward and goes out along the W. coast. This is specially the case with the wind off the land, when there is frequently a 3 knot current off Enizan. The sea is quite bad while a weather-tide is running.

The time of high water in the bay is the same as at Port Lonis, and the rise about $1\frac{1}{2}$ feet greater. Tides.

The most conspicuous landmarks are, beginning in the Landmarks.

W.: Plounéour steeple, a square tower on a height 7 miles inland from the mouth of Pont l'Abbé river; Loctudy steeple, with a tolerably lofty spire, on the low ground to the southward of the river-entrance; the Château de Najac, on the S. end of Chevalier island, inside the entrance; the steeple of Combrit, of which only the spire is visible over the surrounding woods, which latter are a good mark in themselves; the semaphore on Combrit point, the W. side of the entrance to Quimper river; and Kergos châtean, almost hidden in the trees, to the northward of the semaphore.

Od et lights:
Lat. $47^{\circ} 52' 19''$
N.; long. $4^{\circ} 06'$
 $50''$ W. (South
light.)

On Le Coq point, the eastern side of the entrance to Quimper river, is a *fixed red*, catoptric, fourth-order light, elevated 33 feet above sea-level, exhibited from a circular white tower 36 feet high.

North 14° W. from it is a *fixed white*, dioptric, fourth-order light, 56 feet above sea-level, exhibited from a similar tower 30 feet high.

Both lights are visible 9 miles; the former illuminates an arc of only 15° on each side of the range of the two, which leads up the channel.

Loctudy light:
Lat. $47^{\circ} 49' 53''$
N.; long. $4^{\circ} 09'$
 $41''$ W.

On the south side of the entrance to Pont l'Abbé river is a circular stone tower, painted white, 31 feet high, showing a *fixed white*, dioptric, fourth-order light, 35 feet above sea-level, visible 10 miles.

Eastern pas-
sage.

To enter Benodet bay from the eastward, one range is Plounéour steeple barely open to the northward of Najac châtean. This range leads over the plateau of l'Île aux Moutons, with depths of $3\frac{1}{4}$ fathoms only; it would be better to work up to $1\frac{1}{4}$ miles north of that island, and stand to the westward to make the alignment, with nothing less than 6 fathoms. As Benodet lights approach one another, port the helm and steer for them, remaining a little to the eastward of their alignment (the upper light to the right of the lower) to clear a rocky patch, which is covered by 30 feet of water, but on which the sea may be heavier.

Anchorage.

The best anchorage for large vessels is on the last range, with the cross-bearing of Loctudy steeple to the northward of the light; the bottom is sand and shells, at $6\frac{1}{2}$ fathoms, and the shelter excellent from winds between SW. and ENE. through north.

To enter from the eastward at night, bring Loctudy light to bear N. 71° W., and steer for it, passing midway between Mousterlin and Les Moutons rocks. A vessel can even beat in at night, making tacks to open the light 5° on either side of the given bearing. Keep the alignment of Benodet lights, when made, and anchor when the lead shows the desired depth. At night.

This eastern passage is the only safe one at night.

The limits of the beating-room are, in the southward, Najac mansion open to the southward of Plounéour steeple, and in the northward, the flag-staff on Garo island (inside the mouth of Pont l'Abbé river) kept open to the southward of Tudy island, the north shore of the mouth of the river. The former range clears l'Ile aux Moutons, Les Poulains, Men-Diou, and Cluyon rocks, and the latter the point of the Roches de Mousterlin. Beating in.

The largest vessels can take the Chenal du Centre at low water, passing the Basse du Chenal to port, and Malvie to starboard. Kergos château, over Benodet semaphore, (on Combrit point,) leads up a little to the westward of mid-channel, between the two, and is a good range to use if coming in on the port tack. The two shoals will be cleared by keeping between the bearings of the arm of the semaphore on with the abrupt edge of the woods, on one hand, and Kergos château over the guard-house on the point, on the other. Middle channel.

To reach the anchorage, come up from the southward with Benodet semaphore in the middle of Kergos woods, or touching the left side of the château, and when Plounéour steeple comes in range with the steeple on Tudy island, port the helm 3 or 4 points and make the alignment of Benodet light-towers.

There is also a passage east of Malvie shoal, on the range of Kergos mansion over Combrit point, but the channel is narrower than the preceding, and Combrit point is not well defined against the west bank of the river. Pass east of Malvie.

To the westward of the Basse du Chenal is the narrow pass of Cosquer, which is considerably used by coasters. Cosquer château, N. $9^{\circ} 30'$ W., seen through the middle of the lane, leads through, passing over a $12\frac{3}{4}$ -foot patch to the southwestward of the Basse du Chenal. Small vessels beat- Passe du Cosquer.

ing up on this range need only keep one of the flag-staves in sight through the avenue, after passing Roc'h H  lou. Shortly after Ploun  our steeple passes to the northward of that of Tudy island, port the helm and make the range of Benodet lights, unless bound for Pont l'Abb   river, in which case keep on the first course until the Perdrix beacon comes in line with the Maison Durumain, N. 70° W.

Entering the
bay from south-
ward at night.

Coming from the westward at night, and intending to anchor in Benodet bay, steer S. 87° E. for Penfret light as soon as it is made, which will be some time after passing that of Penmarc'h. When Loctudy light bears north, steer for the *white* light of Benodet, N. 12° E., being careful to go nothing to starboard of that course, as it passes only 870 yards from Roc'h H  lou. It would be well to head up for Loctudy light when that of Penmarc'h bears W. $\frac{3}{4}$ N. or W. by N. for $1\frac{1}{2}$ miles, heading off again to the northeastward to bring Benodet light on the bearing N. 12° E.

The course then lies between Faybleau and Juin shoals, covered by only $7\frac{1}{4}$ feet, and unless the sea be so smooth as not to disturb the compasses and to admit of close steering, it would be advisable to anchor to the southward of them until daylight.

Another channel can be taken; coming from the westward on the same course, when Loctudy light bears north, head up to N. 50° E., and bring Benodet lights nearly in line, and steer for them with the *red* one a little open to the eastward of the *white*. This has the advantage of giving a range to steer on independently of the compasses; on the other hand the channel is very narrow; the lights in line lead over Men-Diou, and if open too much, over Basse Tudy. The lower (*red*) light should just be clear, to the right, of the perpendicular through the *white* one.

It would be much safer to stand to the northeastward through the pass south of P  le aux Moutons, and take the eastern entrance to the bay.

Using a sex-
tant.

The sextant may be used with advantage in preference to the compass. Run to the eastward for Penfret light as directed above, and steer NE. after passing the meridian of Loctudy light. Clamp the vernier at $128^{\circ} 35'$, and observe Penfret light and the *red* light of Benodet. When they are both seen in the horizon glass starboard the helm, and when

they coincide head to the northward and westward, keeping on the arc subtended by that angle. The ship will pass between the Basse du Chenal and Basse Malvie, and with the index error known and allowed for in setting the vernier, it is the safest course to follow. When Loctudy light bears NW. by W., the ship's head may be laid to the north-north-eastward, to make the range of Benodet lights.

There is no one channel wide enough for a large vessel to beat up from the southward; it can only be done, in case of having no pilot, by the captain familiarizing himself with all rocks or marks on shore, so as to be able quickly to recognize the following ranges, and work his way up among the many shoals. Making a long board to the northeastward through one of the channels on either side of Les Pourceaux would be much safer, and would entail much less work on the crew in handling the ship.

The first of the shoals is the Basse de Montfort, which is of small extent and rarely breaks. The head is given by Le Run, one of the northern rocks of Les Glénans, touching the west side of Cigogne fort, and the eastern abrupt edge of Kergos woods over Combrit point. The bottom in the vicinity is rocky.

The eastern limit of the working-room is the Basse Rouge. The range of Benodet lights passes well clear to the westward of it, but as they will not always be visible at so great a distance, (7 miles,) the best check is not to approach l'Ile aux Moutons nearer than $1\frac{3}{4}$ miles in the SW.

Rostolou shoal is one-third mile long WNW. and ESE., and has 3 heads, at depths of $8\frac{1}{4}$, $2\frac{1}{2}$, and $9\frac{3}{4}$ feet, respectively, all of which are cleared in the southward by going about before Enizan rock comes in range with Esconil semaphore beyond. Kergos château over the semaphore of Benodet (nearly due north) leads clear to the eastward of them and of Roc'h Hêlou.

There is a narrow passage between these two shoals, both of which break, with Esconil semaphore to the northward of Grand Enizan rock, between it and Petit Enizan.

The Roc'h Hêlou has 2 heads, at depths of 1 and 6 feet. A vessel is north of them when Enizan rock comes on with Saint-Jacques de Guilvinec point, nearly due west.

Beating up
from the south-
ward.

Basse de Mont-
fort; depth, $30\frac{1}{2}$
feet.

Basse Rouge.

Rostolou.

Passage.

Roc'h Hêlou.

Basse Kognès;
depth, $6\frac{1}{2}$ feet.

The Basse Kognès is a dangerous spot, unless the weather be clear enough to see the distant landmarks. It is cleared in the southeastward by keeping Benzec light-tower NE. $\frac{3}{4}$ E., open one-fourth point south of Beg-Meil point. To pass north of it, heading to the northwestward, between it and Basse Tudy, steer N. $49^{\circ} 30'$ W. for Loctudy light on with Plounéour steeple; and to pass south of it keep the latter over Loctudy mill.

After passing the Basse Kognès it would be well not to pass to the westward of Kergos château over Benodet semaphore, as the shoals beyond do not always show, and there are no good ranges for avoiding them. With a NE. wind a long stretch can be made to the northwestward between Faybleau and Juin shoals, with Loctudy light N. 59° W. over Men-Bret rock.

Basse Malvic;
depth, 2 feet.

The Basse Malvic, which is only a few square yards in extent, is steep-to, depths of 6 fathoms being found close-to.

Tudy, Men
Dion, and Clu
you shoals.

The three shoals of Tudy, Men-Dion, and Cluyou are rather too close to each other for vessels to pass between them. The first two uncover, but the latter is 11 feet under low-water level. The group is cleared in the westward by keeping Kergos château open to the westward of the old mill inland of Benodet lights; in the north by keeping Loctudy light slightly open to the southward of the northernmost mill of Loctudy, or Najac château to the southward of Plounéour steeple.

A vessel can pass between this group and Malvic shoal with Benzec light-tower just open to the northward of Beg-Meil semaphore.

Quimper river.

The Quimper or Odet river falls into Benodet bay between Combrit and Benodet points. The mouth of the river is about 2,150 yards wide between these two points, but this is greatly reduced by rocky shelves that project on each side, as also by Le Four rock, halfway across, marked by a beacon. A little over one-half mile up stream, abreast Le Coq point, which is distinguishable by a battery and the lower light-tower, the width is only 220 yards. This is sometimes called the mouth of the river.

The stream is divided into two parts, quite distinct. The part below Lanros is narrow and bordered by steep granitic

hills. The channel is in mid-stream, and there are several good anchorages in $16\frac{1}{2}$ to 26 feet of water over mud.

Above Lanros there is no anchorage without grounding at every tide.

On Combrit point is a battery, near which is also a signal-station, with electric telegraph.

Combrit point.

The bar of the Quimper has $13\frac{3}{4}$ feet on it at low water. The increase of that depth by the rise of the tide may be approximately found by observing the heights above water of various rocks at the entrance. When La Rousse (or Er Ronzès) rock, which is 400 yards SE. from Combrit point and is marked by a black beacon, is entirely covered, $8\frac{1}{2}$ feet are to be added to the depth, and $6\frac{1}{2}$ when Le Four is covered.

River bar.

It is high water, full and change, at the month of the Quimper river at 3^h 11^m. Mean springs rise 11 feet. Both the height and time of any high water can be found by adding $1\frac{1}{2}$ feet to the height at Port Louis, and 3 minutes to the time, both of which are found in the *Annuaire des Marées*.

Tides.

At Quimper, 11 miles up the river, the retardation is 47 minutes in the propagation of the tide.

Abreast of Le Coq point, the tidal currents attain a speed of $4\frac{1}{2}$ knots, and it is slack-water ebb one-half hour after low water. At the bend north of Sainte-Barbe the strength is 4 knots; at the entrance to Lanros it is $3\frac{1}{2}$ knots after 2 hours' rise.

Tidal currents.

Once in the bay, a vessel requiring not more than $13\frac{3}{4}$ feet depth, can approach the Quimper river by making the alignment of the lights, N. $14^{\circ} 15'$ W., and keeping it until about 275 yards from the lower one. Then the course is changed to N. 44° W., passing about 55 yards from Toulgoët point and the coast to the northward of the tower on it, anchoring in 7 fathoms water over sand and mud, when Saint-Thomas comes in line with the end of the jetty.

Directions.

A greater depth can be kept off the entrance to the river by coming to the westward of the range of the lights to avoid the Banc de Benodet, when Locudy steeple comes over the mayor's residence, and steering for La Rousse beacon 1 point to the eastward of the lower light.

Anchorage.

The mayor's residence may not be recognized by a captain coming here for the first time; the ship's head may be laid

for La Rousse beacon, to the eastward of the lower light, as soon as it is made.

Beating up.

There has recently been constructed upon Le Taro, a rock on the eastern border of deep water in l'Anse de Benodet, a stone tower-beacon 7 feet above high-water springs; it is red above high-water mark, with a white band bearing the name of the rock. It gives an excellent range for the limit of boards to the eastward; a vessel should be put about when it comes in line with the upper light-tower of Benodet. After passing it the best range to use in the eastward is Saint-Thomas steeple on with the lower light. Vessels not drawing more than 12 or 13 feet can continue to use it (at low water) until abreast Les Verrès rocks, which are marked by a beacon, and may be approached quite boldly. In the westward a vessel can keep on a few hundred yards to the westward of Kergos Château over the signal-station on Combrit point, until up to La Rousse beacon. The ship may go in stays close under the latter.

Le Four.

Le Four rock is of no very great extent, but it should not be approached nearer than 110 yards in the southward or 55 yards on any other side. Above it put the ship about before the upper light-tower comes in line with a house-beacon on the SE. part of Le Coq point.

Le Coq.

Le Coq rock is 70 yards from the lower light, and is a dangerous spot during the flood-tide, the current setting right on it. Its position is well marked by the eddies in its vicinity.

Instead of skirting the western bank of the river to the anchorage off Saint-Thomas, the east bank may be followed by keeping Benodet point 4° open of Le Coq point.

Benodet.

The town of Benodet, which is small and of no importance, is a little less than a mile within the entrance.

Quimper.

The first town in point of importance on the river is Quimper, some 10 miles above Benodet, following the windings of the river. It is the capital of the department of Finistère, and is the episcopal see. It is among the oldest towns in Brittany, and has a population of about 12,000, mostly employed in fishing, ship-building, and the manufacture of ordinary earthenware, leather, and beer. The imports comprise coal, timber, salt, and resin; the exports,

grain, pilchards, and wine-barrels, of which latter there is a large manufacture.

The greatest draught that can reach it at low water is 9 feet.

There is good anchorage, well sheltered from westerly winds, in $27\frac{3}{4}$ feet of water, over sand and mud, below Le Coq point, on the following cross-bearings: the upper light-tower over the house-beacon on Le Coq point, and Loctudy light on with Combrit point. Anchorage.

The other anchorages in the river are off the inlets of Rosavès, Kerandren, and Kerotret, in $16\frac{1}{2}$ to 26 feet of water, mud bottom.

Off l'Anse de Kergos, one-third of a mile above Benodet, ships foul their hawse at every tide; at high water the swell is felt from outside.

The Pont l'Abbé river discharges itself into Benodet bay, $2\frac{3}{4}$ miles southwestward from the mouth of the Quimper. On the bar is a depth of only $3\frac{1}{2}$ feet at low water, increased to 13 to 20 feet inside. Pont l'Abbé river.

It is high water 8 minutes after the time at Port Louis, and the rise is $1\frac{1}{2}$ feet greater. The foot of the black beacon on Karek Sos, off the light, being awash, shows there is a depth of $13\frac{1}{2}$ feet over the bar. Tides.

Whether coming from the southward or from the eastward, make the alignment of the Perdrix beacon, (black, on the north side of the entrance,) and the Maison Durumain N. 70° W. This leads over the bar; when Loctudy steeple comes behind the southernmost of two mills, steer N. 87° W. for the Loubrière house, which is very distinct, open of Loctudy guard-house point. This course takes through the anchorage. Directions.

The entrance is not practicable of a dark night. In clear weather, having entered Benodet bay, bring Loctudy light to bear N. 60° W., and steer with it 1 point off the port bow, to clear Karek Sos, which should be sighted. Then keep pretty close to the southern shore and anchor by the lead. At night.

Coming from the head of Benodet bay, the ship should not steer for Loctudy light to the southward of S. 70° W., for fear of touching Men-Audierne rock. Caution.

- Pont l'Abbé. The town of Pont l'Abbé is $3\frac{1}{2}$ miles above the bar; the channel to it is narrow, tortuous, and shallow.
- Loctudy. Small vessels come quite frequently to Loctudy to load potatoes and grain. At the end of the jetty is a depth of $3\frac{1}{4}$ fathoms at low water.
- Coast. From the mouth of Pont l'Abbé river the coast runs in a general direction of SW. by S. $2\frac{1}{2}$ miles, when it trends to the westward for $7\frac{1}{2}$ miles, terminating in Penmarc'h point. From the former stretch project several rocky-ledges, with shoals outside them. All these are cleared by the upper light of Benodet over Combrit point semaphore. The foul ground off the latter stretch extends 2 miles to the southward of the general line of the coast.
- Karek Gréiz. Karek Gréiz is a dangerous rock from its position, $1\frac{2}{3}$ miles from the nearest point of land, and from having but $18\frac{3}{4}$ feet of water over it. Its bearings are Loctudy light N. by E. $\frac{3}{4}$ E., and that of Penmarc'h N. 77° W.
- Basse Devel. The Basse Devel, NW. 800 yards from Karek Gréiz, dries 2 feet at low water.
- Caution. Except in clear, smooth weather, it would not be advisable to pass inshore of Karek Gréiz. There would be nothing saved by so doing, except in case of passing to the westward of Rostolon, bound for Benodet bay. It is north of the course round Penmarc'h rocks to the passes about l'Ile aux Moutons.
- The bottom in the vicinity is rocky.
- Enizan rock. Enizan rock, half a mile off shore, is large and well defined, and has deep water close alongside, but 450 yards S. by W. from it is a 13-foot patch.
- Port de l'Esconil. The Port de l'Esconil, just to the westward of the bend in the coast from SW. by S. to W., affords shelter to moderate-sized vessels from northerly winds. Coasters sometimes enter it in the summer, but rarely in the winter, as the SW. and W. winds raise a heavy sea.
- Semaphore. To the westward of the entrance is a semaphore.
- Directions. To approach the port from the SE., steer for Enizan on any course between W. by N. and NW., pass pretty close to the southward of the latter, and steer up N. 32° W. on the alignment of Esconil mill and a prominent rock inside, coming to on that range in 23 feet of water, with Goudoul

rock, S. of the semaphore, masking the point to the westward.

To reach it from the southward and westward, steer N. for Reissant, which never covers, and then for Enizan rock until Esconil mill is over the rock inside.

At $2\frac{1}{2}$ miles westward from Port de l'Esconil is the Port de Guilvinec, which dries at low water. Between the places several ledges project separated by little sandy beaches. Over 300 fishing-boats come there for shelter in the winter, grounding inside.

Two lights have been established leading into Guilvinec or Guilvinec port. One, on the E. side of the entrance, exhibited from a window in a white stone house, 13 feet high, is a *fixed red*, dioptric, fourth-order light, 19 feet above sea-level, visible 6 miles. NE. $\frac{3}{4}$ E., 620 yards from it, is a square stone tower, 49 feet high, painted white, showing a *fixed red*, catoptric light, 50 feet above sea-level, visible 9 miles in the axis of the channel, but only 6 miles 10° each side of it. The lower light is visible through an angle of 180° , beginning at La Charette shoal; the upper only 14° each side of the line of direction.

Guilvinec
lights: Lat. 47°
 $47' 49''$ N.; long.
 $4^\circ 16' 28''$ W.
(North light.)

The plateau off this portion of the coast is steep-to, and the southernmost heads, Gromen, Les Putains, and Les Fourches, can be approached very close. The former is cleared by keeping Enizan open to the eastward of Reissant rock. Les Putains are $1\frac{1}{2}$ miles S. of the coast 1 mile E. of Port Guilvinec; they uncover at low water, but the depths immediately outside of them are $7\frac{1}{2}$ to 10 fathoms. Les Fourches, in the SW. extremity of the plateau, remain awash at the highest springs. They are cleared in the SW. by the range of Notre Dame de la Joie steeple (one-half mile N. of Penmarc'h light) over the large rock of Locarec.

Shoals.

To the northwestward of Les Fourches, off Port Guilvinec, is a sheet of deep water, clear of dangers in itself, but separated from the open sea by several shoals, the Grand Basse, Basse Tener, and the Chiens de Mer or Basse Spinec. These are included in the Roches de Penmarc'h. To the northwestward of them are two more shoals, the Basse Neuve or Névès, and the Basse Salliou, which are only separated by a narrow channel from the rocks on the plateau to the south-

eastward of Penmarc'h point, and over which are depths of $24\frac{1}{2}$ and 32 feet, respectively.

Channels.

There are several channels among these latter rocks, but none practicable for any but small vessels, and only by them when under the charge of a master well acquainted with the ground.

In the sheet of clear water off Port Guilvinec the depths are $6\frac{1}{2}$ to 10 fathoms, but the bottom is rock, so the anchorage would not be good. None but fishing-boats and small coasters can enter the port.

Directions.

To approach this port by the pass west of Les Fourches, bring Men-Meur rock to bear N. $\frac{1}{2}$ W., under the western edge of Kerlane woods. This rock is easily recognized off the point to the westward of Guilvinec, and the range can also be distinguished by observing that the rock will be two-thirds way from Saint-Tromeur steeple to Poulguen mill. Keep the alignment until Du mill comes in range with the white gable of the *magasin*, on the SE. shore of the port, or until the light-tower and light-house are in line.

West passage.

To come in to the westward of Basse Neuve, make and keep the alignment of Du mill (*black*) and the white gable mentioned above. When about 1 mile inside of Basse Neuve, or when Locarec rock, in the westward, comes on with Kérité steeple, open the mill to the eastward of the white gable, to avoid the Basse des Herbes, which is exactly on the range, and is covered by only $1\frac{1}{2}$ feet at low water.

At night.

Make and keep the alignment of the lights at night, opening them to avoid the Basse des Herbes.

A lee.

A vessel caught in a SW. gale and unable to weather Les Glénans or Penmarc'h point, can find a tolerable lee under Les Etocs. Make the alignment leading into the Port de Guilvinec, and steer on it NE. $\frac{1}{2}$ E., until Locarec rock comes under the ruined church of Kérité, when run north $4\frac{1}{2}$ cables, round-to under Baraguen-Bras, and anchor in $27\frac{3}{4}$ feet at low water, 2 cables northward of it. The force of the sea is greatly broken by Les Etocs, and the bottom, which is rocky near Baraguen-Bras, changes to sand at 2 cables to the northward. With good ground-tackle, and by striking the light spars, a ship could ride out a heavy gale.

Life-boat.

The Kérité life-boat will always be on hand to render all possible assistance.

If thick weather prevent the landmarks being seen, run in one-half cable to the southeastward of Férigou-Bras and Férigou-Bian, which are $1\frac{1}{2}$ cables southeastward from Men-Haro, which never covers. Then steer to double Baraguen-Bras, 5 cables NNE. from the latter.

Thick weather.

The SW. limit of the Roches de Penmarc'h runs to the west-northwestward approaching the coast, from which, SW. of Penmarc'h point, it is distant only 9 cables. The southwesternmost of these rocks are the Basses Boutine, La Jument or Ar Gasek, and Les Etocs. They are all cleared by keeping l'Ile Nona, two-thirds of a mile WSW. from Penmarc'h light, bearing to the northward of N. 40° W. Les Etocs open one-half point (at least) to the northward of Nona islet leads clear of all others in the SE. Trévignon point, if the weather be clear enough to see it, in range with l'Ile aux Moutons, E. $\frac{3}{4}$ N., leads clear to the southward.

Roches de Penmarc'h.

Coming from the westward at night, pass at least $1\frac{1}{2}$ miles south of Penmarc'h light, steering nothing to the eastward of SE. by E. from that until Penfret light is sighted, which latter may be steered for, E. $\frac{1}{4}$ S.

At night.

CHAPTER XI.

PENMARC'H POINT TO BREST INCLUSIVE.

Variation in 1876.—Penmarc'h point, $20^{\circ} 00'$ W.; Saint-Matthieu point, $20^{\circ} 10'$ W.; Ile de Sein, $20^{\circ} 10'$ W.

Penmarc'h
point.

Penmarc'h point is a low headland, presenting a convex shore of considerable extent, to which the name of point can hardly be applied except that the trend of the coast changes from W. to N. On it is a township, besides several churches.

Between the town of Penmarc'h and the sea is a low, sandy plain, which would have been worn away long ago but for the rocks breaking the seas from the NW. and S. The houses of Kérity are threatened with destruction before long unless a wall be built to protect that town from the encroachment of the southerly sea.

Shoals.

Off the W. coast of Penmarc'h point are a number of rocks, the outermost of which, Men-Hir, $1\frac{1}{2}$ miles W. $\frac{1}{4}$ S. from the light, always shows above water. Heading N. or S., pass at least one-third of a mile outside it to clear the Basse Névès, a 12-foot patch 1,170 yards in the NNW. Running to the SE. it may be passed at 300 yards without fear of touching anything else. The most conspicuous rock in the group is Nona islet, about 100 yards in extent, 1,200 yards WSW. from the light. Off Taliferne, the NW. extremity of the point, the foul ground extends only 2 cables out.

Penmarc'h
light: Lat. 47°
 $47' 53''$ N.; long.
 $4^{\circ} 22' 35''$ W.

Penmarc'h light-tower stands on the little cape of Saint-Pierre, projecting to the west-southwestward 1 cable from Penmarc'h point; it is 131 feet high, cylindrical in shape, with an enlarged base, and a balcony round the top, which renders it more distinctly visible during the day. The light exhibited is *white, revolving* every 30 seconds, elevated 135 feet above sea-level, visible 22 miles. The illuminating apparatus is dioptric, of the first order. The eclipses are

not total within 12 miles. To the westward of the tower is a semaphore, and between the two stands the chapel of Saint-Pierre.

The light is often called Saint-Pierre light.

Penmarc'h point is not a desirable landfall to make, being so low. An error in latitude might put a vessel in Audierne bay before sighting land, from which in case of W. or SW. winds the only way to work out would be through the Raz de Sein, which is not easy with weather as thick as generally prevails with winds from that quarter. With S. winds there would be similar objections. With W. winds a vessel might run by to the southward of the point, in a squall, if not on it, and bring up on Les Glénans.

Approaching.

With N. or NW. winds, if bound for Lorient or Loctudy, it might be selected.

Experienced seamen on the coast are impressed with the fact that a ship should never be caught in Audierne bay with W. or WNW. winds, if possible to prevent it; should the wind freshen to a gale, there would almost be a certainty of being lost, as the current would be setting with it on the coast. If embayed, however, try to make the coast to the westward of Audierne, as there the current sets out along the shore during nine hours out of twelve. If in the SE. part of the bay, and unable to claw off or weather Penmarc'h, select Poulbrien, Wibbine, or La Torche bays to beach the vessel, having a very good chance there of saving all hands.

It is evident from the foregoing facts that unless perfectly sure of being south of Audierne bay, a captain approaching the coast with westerly winds should do so with great caution, and heave the lead frequently, though it involve bringing by and taking in stun'-sails; the land might not be sighted until too late.

The soundings are an invaluable assistant to the navigator approaching Penmarc'h with westerly winds and thick weather; one special fact should be borne in mind, the knowledge of it greatly decreasing the danger of running into Audierne bay. If mud bottom be found at a greater depth than 44 fathoms, (low water,) the vessel is south of the parallel of Penmarc'h; if 38 fathoms be reached with-

Soundings.

out finding mud, she is north of it, and should be brought by the wind immediately.

On that parallel ($47^{\circ} 47'$ N.) gravel and broken shells will be brought up from 110 fathoms at 125 miles from the point, 82 fathoms at 69 miles, and 55 fathoms at 30 miles. It is about here that the *fixed* and *flash white* light of the Ile de Sein will be raised in the NE., after which the *fixed white* light of the Bec du Raz, and, finally, in the east, Penmarc'h light will be sighted. If at all to the northward, the *white* light of Audierne may also be seen in the N. by E. $\frac{1}{2}$ E., but it will gradually become feebler, and will soon disappear.

Landfall

From a vessel 5 miles northwestward from Penmarc'h point, there will be seen, far away in the SSE., Les Etocs, and nearer, in the same direction, Nona islet; then, successively, to the left, Penmarc'h light-tower, with Saint-Pierre chapel and semaphore to the right of it; Kérity mill, nearly on with the ruined church, called Saint-Humet, which has a small belfry; Notre Dame de la Joie church; Penmarc'h church, with two steeples, in the middle of the town; the gray, sombre, square tower of Saint-Guénolé, with its mill to the left; Taliferne point, the highest rock in the vicinity, with a little white hut on it; La Torche, a peninsula, with a ruin on it, presenting the appearance of an islet, especially in foggy weather, and so high as to be visible over Penmarc'h point from the southward. There are then, to the northward, a number of churches, among which the most conspicuous are, that of Notre Dame de Trounouane, with three steeples, on a hummock two thirds of a mile inland; that of Plounéour, on a height $3\frac{3}{4}$ miles in the interior, visible from NW., W., S., and SE.; and that of Plouhinec, about two miles east of Audierne, the white spire of which is seen from seaward before the land is raised.

Coming from
southward.

Vessels coming from the southward would not be apt to make the landfall at Penmarc'h, unless too much allowance had been made for the northwesterly current. The land is low for 4 miles eastward from the point. To a vessel 5 miles south-southeastward of it, there would be seen, to the left of the light, Nona islet, and outside the latter, Men-Hir and Guerveur always show above water. The latter are commonly called Les Pélen by pilots and others. Saint-

Pierre chapel and semaphore will be seen to the left of the light-tower. The chapel is a large edifice, with a square tower visible some distance. To the right will be seen, in order, Saint-Pierre village; Notre Dame de la Joie church; Kérity mill and church, (in this direction will also be seen the red roof and white gable of the life boat house;) Les Etocs rocks; Saint-Guénolé mill and tower. From the deck of a good-sized ship La Torche peninsula will also be seen over the land.

Besides these marks are a number of churches and steeples farther to the eastward, of which Plounéour is the most conspicuous.

Having made land, if bound to the southeastward, follow directions given in the latter part of chapter X.

From Saint-Pierre cape the coast runs N. $\frac{3}{4}$ W. $1\frac{1}{2}$ miles, to Taliferne point, on which the sea breaks with such fury during NW. gales that the roar is heard at Pont l'Abbé, 7 miles off. In fact, it takes its name (Hell's hole) from having a hole into which the sea dashes with a tremendous noise. Rocks extend 1 mile to seaward, among which are the entrances of the two little ports of Saint-Guénolé and Notre Dame de la Joie, where the smaller coasters can run in and ground.

The violence of the sea striking here from NW. is illustrated by the huge masses of rock, 25 and 30 cubic yards in size, that have been carried up 50 to 75 yards from the shore. For 200 yards inland the low ground is covered by fragments, of the size of paving-stones. During a very heavy gale the inhabitants declare it to be as dangerous to walk there as in front of an exploding mine.

From Taliferne the coast runs 1 mile east-northeastward, and is indented by two small bays, Wibbine and Poulbrien, which, together with Portz-Carn, in the SW. part of l'Anse de la Torche to the eastward, are the only places where a vessel embayed and unable to claw off against a westerly gale could be run on shore with any chance of saving the crew.

Poulbrien is an opening in the coast, just north of Taliferne, 200 yards deep. A vessel running in there would have $8\frac{3}{4}$ fathoms at low water. It has the advantages of good depth at the entrance, no breakers outside, and no shoals to

be avoided; the crew could land on the falling of the tide. On the other hand, it being only 70 yards wide, there is the danger of driving on the east or west shore, from the sea catching the stern.

Directions. Steer south for Taliferne point in range with Penmarc'h light until 2 cables from the former, which is distinguished by its comparative height and a white hut on it. Then run in SE. for Poulbrien, right for the head of the bay, keeping a little nearer to the shore on the starboard hand, steering for about 110 yards to the right of Saint-Guérolé tower, and nearly for the two mills immediately to the left of Kérité church.

In thick weather this tower is the most conspicuous object on the coast, either from NW. or west.

Wibbine. The fishermen give Wibbine as the best place for beaching, although the coast be rocky; it possesses the same good qualities as Poulbrien, and, in addition, is 230 yards wide; the ship, losing part of her keel, of course, on the rock, would slide on a tolerably smooth plane, and the crew could reach the land from the head booms. It is a cove running in about 250 yards, 600 yards from Poulbrien, just west of Portz-Carn point. The depth is $5\frac{1}{2}$ fathoms at low water.

Directions. On approaching Taliferne, put the helm up to steer for Saint-Guérolé tower on with Kérité mill, just to the right of the church. When about 1 cable off, bring the tower twice its own thickness to the right of the mill to enter the cove. After entering, put the helm hard over to port, and the ship will slide up the rock on the SW. shore, sheltered from the sea. On the eastern side of this little bight the sea would soon knock a ship to pieces.

If too far to leeward to make the first range given, try to keep to windward of the line of the light and Saint-Guérolé mill, to the right of the church. Their alignment leads only 60 yards from a rock which dries 7 feet 160 yards NW. from Portz-Carn mound.

The inlet of Wibbine, in bad weather, is covered with white water, but outside there are no breakers.

Portz-Carn. Some French charts give Portz-Carn as the only safe place for beaching a vessel, during gales from WNW. and WSW. This is stoutly refuted by the pilots and seamen in the vicinity, and it is indeed difficult to see wherein its great

advantages lie, as the outlying rocks are not easy to avoid among the breakers, and the depth between Portz-Carn point and a rock left to port in entering is only 10 feet at low water, or about 24 at high water, which is very little with a heavy sea running. Several vessels, of moderate size, however, have run in there, saved their crews, and been lifted off afterward, with comparatively slight injury.

Being about 1 mile to the northward and westward of La Torche, keep the hummock of Portz-Carn on with the ruined church of Kérity, and when about 3 cables from the hummock, or when La Torche bears E., steer to pass about 70 yards from Portz-Carn point, keeping two mills, seen close together to the left of Kérity church, just to the right of two or three low, isolated houses on the beach. As soon as Portz-Carn point bears to the westward, hard a-port the helm and drive on the first little stretch of sand to the right. This latter course will be S. $\frac{3}{4}$ E. Directions.

It is important to try to strike the beach within a couple of hours after high water. Caution.

La Torche bay is bounded in the N. by the narrow peaked point of the same name, crowned by a ruin. La Torche point.

The coast then for 13 miles is low, and dark in appearance. It runs NNW. and NW., forming a bay 3 to 4 miles deep, bordered by a sand-beach extending 6 miles, from La Torche to Notre Dame de Penhors, a little chapel with two steeples, built right on the shore, and WNW. of which is an old semaphore. Thence to Plouzeret, which steeple is seen near that of La Trinité, two-thirds mile to the northward and eastward of it, the coast is fringed with rocky ledges, beyond which is a 1-mile sand-beach, separated by the black, steep, rocky point of Le Souc'h from still another beach $1\frac{1}{2}$ miles in length, extending to SW. of Plouhinec steeple, which stands on a height 2 miles east from Audierne. The pine woods of Mené, to the westward, are also a good landmark. In this bay depths of 9 fathoms are found $1\frac{1}{2}$ miles from the shore. The bottom is sand from La Torche to a short distance SW. of Notre Dame de Penhors; from there to Audierne it is rock. Audierne bay.

At Plouvan, 9 miles to the southward and eastward of Audierne, is a rocket-apparatus for sending a line to a vessel ashore. Rocket-apparatus.

Plateau de
Penhors.

The Plateau de Penhors is that portion of rocky bottom included between the meridian of Penhors and Plouzeret. Outside it is sand.

Excepting perhaps a small pebbly inlet to the southward of Le Souc'h point, there is not a place on the shore of the bay where a ship's boat could land with safety during SSW. to NW. breezes. The Gavrais are the only fishermen. They take to the water like dogs, and are of very great assistance in saving the crews of vessels driven ashore.

Anchorage.

Vessels have been known to ride out tolerably heavy gales of wind, in 6 fathoms (low water) sandy bottom, with La Torche bearing ESE., and Penmarc'h light in the south-southeastward. The currents there are feeble. A vessel drawing too much to remain in such depths with a high sea, could come to at or near high water, and the Kérité life-boat, which is seldom deterred from putting off, could land the crew before low water.

Currents.

At 10 miles off Penmarc'h the current of the flood sets northeastward and then on the coast; the part that strikes abreast N. D. de Penhors divides into two branches, one of which runs to the southward round Penmarc'h point, and the other to the northwestward toward Audierne and the Raz de Sein. The seamen about Audierne agree in saying that 2 miles off La Gamelle, during the first three hours of the ebb the current sets to the southeastward, and during the last three of the ebb and all of the flood, that is, for nine consecutive hours, it runs to the northwestward.

Pointe de l'Er-
villy.

At $14\frac{1}{2}$ miles NW. by N. from Penmarc'h, and $7\frac{1}{2}$ miles ESE. $\frac{1}{2}$ E. from the Bec du Raz, is the Pointe de l'Ervilly, moderately high, with a round tower quarter way up the

Semaphore.

height, near a semaphore. The dwelling of the latter is white. Geographical number, B. G. P. F.

Audierne.

At $11\frac{1}{6}$ miles to the northeastward of it is the Pointe de Raoulic, crowned by a battery, the west point of the entrance to the Goayen river. On the right bank of the latter, about three-fourths of a mile up, is the town of Audierne, hidden by the high point on which stands the upper light-tower. Opposite, on the left bank, is the village of Poulgoazec.

Port.

Vessels drawing $16\frac{3}{4}$ feet can enter the port or river at high-water springs; but portions of it dry at low water

Vessels rounding inside are sheltered from all winds. The largest vessel that has entered for a number of years was of 300 tons burden, drawing 14 feet.

At Audierne, near the garden of the Capucins convent, is a circular tower, 31 feet high, showing a *fixed white*, catoptric, fourth-order light, 69 feet above sea-level, visible 12 miles 15° each side of the line to the lower light.

Audierne
light: Lat. 48°
 $01' 10''$ N.; long.
 $4^{\circ} 32' 32''$ W.

The latter, 1,203 yards S. 15° W. from the former, is a *fixed red*, fourth-order, dioptric light, exhibited, at an elevation of 36 feet, from a circular tower 30 feet high, on the end of a jetty built on the rocks projecting from Raoulie point. It is visible 7 miles.

Raoulie point
light: Lat. 48°
 $00' 34''$ N.; long.
 $4^{\circ} 32' 33''$ W.

In line the two lead up the channel west of La Gamelle shoal.

To the westward of the light-towers are two white pyramidal beacons, leading up the Grand Cheual, N. 20° E. Beacons.

A life-boat is stationed here; it is launched in the port at high water, at Trescadec at low water. Life-boat.

The bar of the river abreast the lower light dries 4 feet at low water. Bar.

It is high water, full and change, at Audierne, at $3^h 15^m$. Tides.
Mean springs rise 13 feet; neaps, $6\frac{1}{2}$ feet.

On Le Corbeau rock, 300 yards southeastward from the lower light, is a beacon. Le Corbeau.

The shoal of La Gamelle is a little over half a mile in extent, lying about three-fourths of a mile to the southward of the river bar; a black buoy marks the NE. extremity, and a red one the west. It dries $6\frac{1}{2}$ feet at low water. Running to the northwestward or southeastward off the port, the red buoy should be passed at two cables, keeping the Bec du Raz open of Pointe de l'Ervilly. La Gamelle.

Barzie shoal is 200 yards to the NW. of the red buoy of La Gamelle. The bottom is rocky at $11\frac{3}{4}$ feet, and steep-to. Basse Barzie.

About 200 yards west of Barzie shoal is that of Pouldu, covered by $19\frac{1}{2}$ feet at low water. It extends 500 yards to the southward. Basse Pouldu.

The Basse Fornic is the most easterly of all the shoals. It is covered by 9 feet of water, and is separated by only a narrow channel from La Gamelle in the NW. Basse Fornic.

In heavy SW. gales there is a line of breakers all the way across from Pointe de l'Ervilly to Pointe de Souc'h. Breakers.

- Roadstead.** Inside these dangers is Audierne roadstead, in which the depth is 13 to $16\frac{1}{2}$ feet, over sand and rock. Small vessels, prevented from entering the port, have ridden out moderate gales of wind under the lee of La Gamelle; but the anchorage cannot be called good. The best range for coming-to is that of the two white pyramids west of the lights; sand bottom predominates there.
- Entering.** There are four passes leading into the port of Audierne.
- Eastern channel.** In the eastern channel, between Basse Fornic and La Gamelle, there are only $7\frac{1}{2}$ feet of water, and it is impracticable, even for vessels drawing less than that, with the wind from the west, north, or east, or fresh from south.
- Channel west of La Gamelle.** The channel to the westward of La Gamelle has a least depth of $14\frac{3}{4}$ feet at low water, between the shoals, and 13 feet at 300 yards off the mole. The range of the two light-towers leads up it. After passing the red buoy on La Gamelle port the helm a little to avoid the Basse Barzic.
- The channel breaks, in bad weather, from the Basse Naour (the tail of Barzic) to La Gamelle.
- Caution.** Do not trust to the red buoy of La Gamelle always remaining in place.
- Grand Chenal.** The Grand Chenal is the deepest of all, having not less than 4 fathoms between the shoals, and 13 feet at 500 yards from the mole. It is between Barzic and Pouldu shoals. The sea never breaks in it.
- Directions.** The range of the two white pyramids leads up it, N. 20° E., after which pass 55 yards from the lower light, and keep on parallel to the tow-path.
- Chenal de la Vierge.** The Chenal de la Vierge is close inshore, between l'Ervilly point and a detached rock, the Basse Neroth.
- Signal station.** From a signal-staff, near the upper light, piloting-signals are made to bring vessels in or warn them off.
- Population.** The population of Audierne is about 2,000.
- Commerce.** There is a comparatively extensive trade to and from the place, carried on in foreign as well as native bottoms. The exports consist principally of alkalies, rye, wheat, fish, and empty casks.
- Coast.** From Pointe de l'Ervilly to the Bec du Raz the distance is $7\frac{1}{2}$ miles, and the coast between runs WNW. $\frac{1}{2}$ W. It is steep-to, of moderate height, and over it are seen four or

five steeples. Boats can land, with an off-shore breeze, in l'Anse de Cabestan, bordered by a half-mile beach, 1 mile from l'Ervilly point; in Le Loch, a small pebbly bay, $1\frac{1}{2}$ miles farther to the westward; at Portzloubous; at Portzen; and at Brestrée, SE. of the semaphore.

On the parallel of Pointe de l'Ervilly, commencing at $3\frac{1}{2}$ miles from it and extending to the westward, are a series of shoals, over which are depths of 22 to 28 feet, with the exception of Les Ninkinous. They are all cleared by keeping Plouhinec steeple midway between the tower and the mill on l'Ervilly point, until La Vieille rock (off the Pointe du Raz) is open to the right of Le Tevennec, which last range can be kept for the Raz de Sein. In bad weather it should not be attempted to pass either over or between the shoals, as the sea breaks heavily throughout as well as on the entire plateau extending, 1 mile from land, between Basse ar C'harn and l'Ervilly point. Shoals.

All the coast of Finistère, from the meridian of Audierne to the Bec du Raz, is called Le Cap Sizun. Cap Sizun.

The Basses Piriou are 400 yards in extent N. and S., and 300 yards E. and W. They are $3\frac{1}{2}$ miles W. from Pointe de l'Ervilly; over the southern part the depth is $23\frac{1}{2}$ feet. To pass inshore of them keep Coumodoc, a large pointed rock in the NW., open to the left of Gorlégréitz rock; to pass between them and Les Ninkinous, keep the right edge of Coumodoc on with the Bec du Raz. Plougof steeple bearing N. leads midway between them and into Portzloubous. Basses Piriou.

Les Ninkinous are four in number, making a quadrangle, 4 cables long E. and W., and 2 cables N. and S. On the NE. rock is a depth of 13 feet, and on the two in the SW., 23 feet. They are 1 mile to the westward and a little N. of the Basses Piriou. To pass between them and the Basse ar C'harn, keep Le Tevennec touching the W. part of Gorlégréitz. La Vieille rock on with Le Tevennec leads 6 cables SW. of them. Les Nin kinous.

The Basse ar C'harn, 1 mile W. by N., is covered by $28\frac{1}{2}$ feet of water. La Vieille rock on with Le Tevennec leads 360 yards to the southward and westward. Basse ar C'harn

Masclougréitz shoal is composed of two patches of 5 and 6 fathoms respectively, 200 yards apart. It is a dangerous Masclougréitz

spot because of the tremendous sea raised by a weather tide. Its bearings are: Le C'hlec rock, off Pointe du Van, touching the Bec du Raz, NNE. $\frac{3}{4}$ E.; the left side of Ar Gador (a square rock on l'Île de Sein) in range beyond Le Gouelvan, a solitary rock, narrow and leaning to the right.

To pass between Masclougréitz and Ar C'harn, keep Le Tevennec open its own width to the westward of La Vieille.

To pass between Masclougréitz and Cornoc-Bras, keep Le C'hlec rock on with the left side of Gorlégréitz.

Cornoc-Bras.

Le Cornoc-Bras is a shoal 1 mile W. of Masclougréitz, covered by $10\frac{3}{4}$ to $26\frac{1}{4}$ feet of water. The seamen in the vicinity call it Le Grand Cornet. At low water the kelp growing on it is visible.

Bec du Raz.

The Pointe du Raz is the western extremity of Cap Sizun, in the department of Finistère. The rocks forming the extremity of the point are only about 20 yards in extent north and south; but a number of others, some of which cover and uncover, extend $1\frac{1}{4}$ miles to the westward of the light.

Life-boat.

A life-boat is stationed at the Bec du Raz.

Rocks.

Of the rocks off the Bec, La Plate (or Petite Vieille) is the farthest out, and dries $11\frac{3}{4}$ feet; it is of small extent, and is about 200 yards SW. of La Vieille, a large rock always showing above water, and which appears from a distance to be the outermost, and well separated from any other. La Plate is a most dangerous shoal from not being seen between half-flood and half-ebb, except in heavy weather, and from the strength of the currents flowing round and over it.

Inshore, to the eastward of it, are Cornoc La Ruina and Argoënt, both of which uncover. The latter is near Gorlégréitz, a large rock, commonly called Gourlé, always showing above water and surrounded to 100 yards by others that cover at high water. Lastly, Gorléis, which also remains above high water, is 20 yards from the point. Between it and Gorlégréitz is a channel with 19 feet at half-tide; vessels of 100 tons have often passed through. Boats are apt to be drawn in by the current of the ebb when becalmed in the northward.

On the highest part of the Bec du Raz is a square tower, 49 feet high, showing a *fixed white*, dioptric, first order light, elevated 259 feet above sea level, visible 18 miles. Lights: Lat. $48^{\circ} 02' 19''$ N.; long. $4^{\circ} 44' 00''$ W. (East light.)

On a cliff 220 yards N. 87° W. from it, in the direction of the Basse Plate, is another *fixed white* dioptric light, visible 10 miles, exhibited at an elevation of 206 feet above sea-level, from an iron tower 26 feet high. This light is visible when between the bearings of S. 10° E. and S. 40° E., illuminating the space between Les Barillets and the rocks off the Pointe du Van; and when between the bearings of N. 69° E. and S. 69° E., covering La Vieille and other rocks. From being built on the cliff it is sometimes called La Falaise light, and will be so distinguished in this work.

At one-third of a mile E. by S. from the Bec du Raz light-tower, is a semaphore signal-station, the house of which is white. Semaphore.

From the Bec du Raz the shore runs 1 mile east, bending again to the northward $1\frac{1}{2}$ miles to the Pointe du Van, after which it trends to the eastward again. There are several rocks near the latter point, among which are Le Van, quite large, and close inshore; Le C'hlec, narrow, some distance out; Basse Jaune, (Bas Veleau,) which dries 2 feet, 1 mile N. by E. from the point. Other shoals, covered by various depths, extend to the west-southwestward, the principal and outermost of which is Cornoc an Tréas, 7 cables from the point, and which dries at low water. All the latter are cleared in the northward by keeping Brézellec point, 2 miles E. by N., open of Pointe du Van. Pointe du Van.

At 3 cables south of Saint-They chapel, on the latter point, is the opening of a little ravine, where boats can land with N. or NW. winds.

Between the Bec du Raz in the SSW. and Van point, in the NNE., is the bay of Les Trépassés, at the head of which is a two-third mile sand-beach, from which opens a little valley. In it fine gray sand will be found at 9 fathoms, but there is always a swell heaving in from NW., rendering anchorage undesirable; the breakers extend 400 yards from the beach. Baie des Trépassés.

The NE. shore is steep-to, but fringed with the rocks mentioned above. These are cleared in entering the bay by keeping to the southward of the range of Plougof steeple,

(the largest at the end of the valley,) open to the right of the NE. end of the beach.

On the southern shore, north of the semaphore, and westward of the rocks near the beach, is Poul-Mostrée, where boats can land with southerly winds. The place is recognizable by the path and steps.

Chaussée de Sein.

The Chaussée de Sein, or des Saints, constitutes the great danger to vessels bound northward for the English channel or Brest. It is an extensive cluster of islands, rocks, and shoals, occupying a space of $11\frac{3}{4}$ miles in length, W. by N. and E. by S.; the breadth is nearly 2 miles in the eastern part, tapering to a few hundred yards at the western end.

Ile de Sein.

L'Ile de Sein, in the eastern section, is the largest of the group, low, flat, 2 miles long and inhabited by a few fishermen and pilots. In the NE. part, near the settlement, is a small harbor, with gravel and mud bottom, which dries at low water. North of the village is Ar Gador rock, which, viewed from the SE., appears flat, with precipitous sides, and split in the middle.

Light: Lat.
48° 02' 40'' N.;
long. 4° 52' 12''
W.

In the NW. part of Ile de Sein stands the light-tower, which is circular, 142 feet in height, and exhibits a *white fixed* and *flash* light, elevated 148 feet above the sea, visible 18 miles. The *flashes* are at intervals of 4 *minutes*, preceded and followed by short eclipses, which, in ordinary weather, are not total within 12 miles. The illuminating apparatus is dioptric, of the first order.

Life-boat.

There is a life-boat stationed on the island.

Basse Occidentale.

The Basse Occidentale, the western extremity of the Chaussée, is $8\frac{1}{2}$ miles W. $\frac{3}{4}$ N. from the light, and is covered by $23\frac{1}{4}$ feet of water.

Basse Froide. ¶

All that part of the Chaussée extending 4 miles to the eastward of the latter is called the Basse Froide, and includes numerous shoal patches. In the eastern part several of these are awash at low water, and three uncover in ordinary tides: Le Corneugen (5 feet) on the range of the Bec du Raz and Ile de Sein lights; l'Ar Men ($13\frac{3}{4}$ feet) 5 cables east of the latter, (a light-tower is in course of construction on it;) and Bas-Ven ($8\frac{1}{2}$ feet) one-half mile north of the latter.

Passage.

A vessel drawing 22 feet can cross the Chaussée east of this tower, passing 3 cables from it. Going northward, at

low water, the vessel's head may be laid for Bas-Ven, passing afterward 300 yards east of it. This will lead 100 yards from a 3-foot patch SE. of Bas-Ven.

At 1 mile east of Ar Men is Le Morvesen rock, which dries 10 feet; between it and l'Ile de Sein is the Pont de Sein, on which are a multitude of rocks showing at low water, increasing in number toward the island. There are two passes among them, hardly practicable because of the swiftness of the current; but a vessel might be caught there in a fog with strong southerly winds and have no other chance of keeping off the rocks. Pont de Sein.

The Passe de Hélorète is 3 miles west of the light, and runs north and south, passing one-half mile inside of Ar Neurlac'h, a large rock, surrounded by a number of smaller ones, and the outermost of those that never cover. The channel is 1 cable in width, with a least depth of 23 feet at low water, and is bordered in the west by Ar Heulé, which dries 18 feet at lowest springs; Hélorète, which dries the same amount; and Ar Trouisque, farther north, which dries 11 $\frac{3}{4}$ feet. In the east it is bordered by Cornoc-guen, which dries 5 feet, and Poullenou, which remains awash at high water. Passe de Hélorète.

The Passe de Trousyard runs NNW., and is 1 $\frac{1}{2}$ miles long. The southern entrance is 1 $\frac{1}{2}$ miles SW. by W. $\frac{1}{2}$ W. from the light-tower. Le Forhok and Le Trousyard, neither of which ever cover, are passed to port. Passe de Trousyard.

A vessel caught to windward of the Chaussée, and unable to work off, should try to make the channel just east of the light-tower in course of construction on Ar Men. The navigation of it is much easier than that of the two just described. Caution.

The easternmost shoals of the Chaussée comprise a number forming the Pont des Chats, one of which, Le Chat, 2 $\frac{1}{2}$ miles S. 61° E. from the light, dries 4 feet at low water. The foul ground extends one-half mile to the eastward of it. Pont des Chats.

It is high water, full and change, at l'Ile de Sein at 3^h 21^m. Ordinary springs rise 17 $\frac{1}{2}$ feet, neaps 11 $\frac{3}{4}$ feet. Tides.

At 3 $\frac{1}{4}$ miles NW. $\frac{3}{4}$ W. from the Bec du Raz is Tevennec islet; it is quite large, and is surrounded by rocks and shoals extending 1 mile to the southeastward, and two-thirds of a mile to all other points. The flood-tide setting Tevennec islet.

on the plateau during the last four hours makes it a somewhat dangerous spot.

Light: Lat.
48° 04' 19" N.;
long. 4° 48' 00"
W.

On Tevennec rock stands a square, stone tower, 43 feet in height, from which is exhibited, at an elevation of 92 feet above the sea, a *white flash* light, with one *red* sector. It is visible 13 miles. The interval between the *flashes* is 4 *seconds*; the illuminating apparatus is dioptric. The light shows *white* when between the bearings of N. 15° W. and N. 32° W.; *red* when between N. 32° W. and N. 72° W.; *white* again between N. 72° W. and east through south. It is obscured when between east and N. 15° W. through north.

The bottom in the vicinity of Tevennec islet is rock, except in the northward, where finely-broken shell is found 1 mile off, at 27 fathoms. A vessel becalmed, and drifting on the rock with the ebb-tide, can anchor there.

Les Barillets.

The two rocky heads called Les Barillets, at depths of 3 and 5 feet respectively, are 800 yards southeastward from Tevennec; just clear of them in the SE. is a 22-foot patch, and still farther out two of 5½ and 6½ fathoms. Béguéluan rock, 200 yards to the north-northeastward, indicates their vicinity until half-flood, when it covers.

Other shoals.

Among other rocks on the Tevennec plateau, the exterior are Forhok, 400 yards in the eastward, which dries 13 feet; Basse Triton, 800 yards N. by E., covered by 5½ fathoms; Le Kéréon, which never covers, 4 cables WNW., to the westward of which other rocks extend 2 cables farther. Among the latter is Le Moudenou, two-thirds of a mile W. by N. from Le Tevennec; over it are depths of 3¾ to 6½ fathoms. The Basse Plate or Ar Vas, which dries 1 foot, is half a mile SSW. ½ W. from Tevennec, and 50 yards SE. from it is a little plateau, over which are only 3 fathoms at low water.

All these shoals are cleared in the SW. by Coumodoc rock, (SE. of Pointe du Raz light,) to the right of Gorlégréitz rock.

To distinguish
Ile de Sein from
Ouessant.

Since the establishment of Tevennec and La Falaise lights there is not much danger of confounding Ile de Sein and Ouessant island, as was frequently done some years ago. Approaching from the southward at night, however, there is still a possibility of so doing, as a revolving light (every

half-minute) will be seen in the eastward, whether the land ahead be the one or the other of the two islands; in the one case it would be Saint-Matthieu light, and in the other, that of Penmarc'h. It must also be borne in mind, that, of the four lights now exhibited in the immediate vicinity of Ile de Sein, only two are seen from the southward, and that the easternmost is *fixed*, and the other shows *flashes*, which also obtains in making those on Ouessant. On the other hand, Ile de Sein light is constantly *white*, and flashes only once in 4 *minutes*, whereas the western light on Ouessant flashes 3 times in 1 *minute*, *once red* and *twice white*. Should these very apparent differences be disregarded, La Falaise light will suddenly show in the ENE., possibly in time to bring by the wind and head off W. or SW.

In the day-time it must be remembered that Ouessant is a high and extensive island, the top of which is level, and on which are only two light-towers and a few mills and isolated houses. To the eastward as well as to the westward of the high land, rocks will be seen comparatively low and not far from the island. L'Ile de Sein, on the other hand, is low, and has no mills. What houses there are, are principally grouped near the steeple. The rocks extend $4\frac{1}{2}$ miles to the westward of it, and broken water some distance beyond that. The high land of the Bec du Raz might, in thick weather, be taken for Ouessant. The semaphore near the light would assist the illusion. But there is nothing on Ouessant to correspond to the light-tower on Tevennec, or the one building on Ar Men rock.

There is also a notable difference in the soundings to the southward of the two islands in question. South of Ouessant depths of 49 fathoms will be kept from 12 miles to about 1 mile distance, but south of the Chaussée de Sein the depths are not greater than $16\frac{1}{2}$ fathoms at 1 mile, increasing to 30 fathoms at 7 miles, and only 42 at 11 miles.

Steering N. or NE., off this portion of the coast, is always dangerous, unless sights have been obtained during a continuation of good weather, and the exact position be known. Not unfrequently have vessels, bound for the English channel or expecting to make Ouessant, sighted the Chaussée ahead from errors of 30 or 40 miles of longitude. The gun-boat La Panthère, coming up from the Mediterranean, sud-

Soundings.

Approaching
the Chaussée de
Sein from the
southward.

denly made Ile de Sein light right ahead, when the reckoning put her 40 miles clear of the Chaussée. The wreck of the Sané was also brought about in a similar way. The only safeguard against such terrible mishaps is in the frequent and regular use of the lead. If bound to the northward round the Chaussée de Sein, it is recommended, during continuance of fogs, not to go inshore of the 75-fathom depths, and anyhow to sound at least at every 10 miles, while on a N. or NNE. course. This maximum distance between soundings is not given arbitrarily, but for the following reason: Depths of 42 fathoms are found to the westward of the Chaussée, or not less than 11 miles to the southward. Should a cast in that depth give a falsely greater depth, from not being *up and down*, or from any error or carelessness, 10 miles could be run, and then the lead would give unmistakable evidence of the approach to land.

Caution.

If the flood-tide be making, its drift should be added to the vessel's speed through the water to make the 10 miles over the ground between soundings.

To avoid the
Chaussée.

A set of rules, accompanied by a table, have been laid down by Capt. H. de Roujoux, of the French navy, for avoiding the Chaussée de Sein, when coming from the southward in thick weather. Extracts from them are as follows:

Rule.

When, from the estimated position of the ship, in latitude 46° or $46^{\circ} 30'$, Ouessant island bears between N. and NE., shape a course directly for it, and begin sounding at every 10 miles from the time that the reckoning puts you 10 or 20 miles from the topographical curve of 164 fathoms. If less than 192 fathoms be found, when the estimated position plotted would call for more, head off to SW. until no bottom is reached with 192 fathoms of line out, and then steer again for Ouessant. After finding depths of less than 164 fathoms on the new course, 35 miles may be made without sounding; after which the following table (No. I) should be used until certain of having passed the Chaussée.

TABLE I.

Soundings reduced to low water.	Nature of the bottom.	Courses to be steered, (true.)	Maximum distance between soundings.
Over 65 fathoms	Mud	WNW	10 miles.
	Any but mud	N	10 to 3 miles.
Between 60 and 65 fathoms..	Mud	WNW	10 miles.
	Any but mud	NNW	10 to 3 miles.
Between 54½ and 60 fathoms ..	Whatever it be.....	WNW	10 miles.
Less than 54½ fathoms.....	Whatever it be.....	W	10 miles.

This table, like the others farther on, is used in the following way: Taking the first line as an example, if the depth found, reduced to low water, be over 65 fathoms, and the bottom mud, the course should be made WNW., making 10 miles, as a maximum, without sounding. If the bottom be not mud steer N. (true) sounding according to judgment, but not less often than every 10 miles.

Coming from the northward there is no great danger of striking the Chaussée de Sein. Bound out from Brest there is only a short distance to run after discharging the pilot; the only necessary precaution is to make allowance for the set of the ebb-tide. But the following rules given by Captain Roujoux may be of service to a vessel coming from the English channel, with the latitude known to be between 48° 5' and 48° 18'. Coming from the northward.

Being in 60 fathoms water, and latitude between 48° 5' and 48° 18', apply the rules given in Table No. II. Rule.

TABLE II.

Soundings reduced to low water.	Courses to be steered, (true.)	Maximum distance between soundings.
Over 60 fathoms	SE.....	1 mile.
Between 55 and 60 fathoms.....	S	1 mile.
Less than 55 fathoms	W *.....	1 mile.

* During the flood-tides steer WSW. instead of W., and during the ebb-tide WNW instead of W., or more or less to the northward or southward, according to the stage of tide and strength of current.

By the time that 4 or 5 miles of westing have been made from the starting point, the vessel will be on the parallel of the Chaussée, approximately.

The vessel may also be considered on that parallel when

the difference between two consecutive soundings (one being over 60 fathoms) is over $5\frac{1}{2}$ fathoms.*

Coming from the westward.

Coming from the westward in thick weather, the greatest caution should be observed, and it is decidedly advisable to select Ouessant for a landfall; as a vessel would be in the breakers of the Chaussée de Sein long before making land. If certain, however, of being to the southward of the parallel of the Chaussée, the following rule may be adopted, making ample allowance for any error in latitude that might put the vessel N. of 48° .

Rule.

Steer E. until in 66 fathoms, when follow the rules in Table No. III, unless soft-mud bottom had been found before reaching the 66-fathom line, in which case Table No. IV should be entered immediately.

As soon as 10 miles in longitude have been made after commencing to use Table No. III, use Table No. IV until it is evident that the 55-fathom line runs to the northward, when steer N. also, and the fact of having doubled the Chaussée will be shown by the 55-fathom line trending to the northeastward, and by irregularities in the soundings.

This rule was devised from consideration of the fact that a line drawn ESE. and WNW., passing 13 miles westward of the Chaussée, would coincide, between the meridians of $4^{\circ} 32'$ W. and $5^{\circ} 15'$ W., with the 55-fathom line of soundings, which latter runs northward near the latter meridian.

TABLE III.

Soundings reduced to low water.	Courses to be steered, (true.)	Maximum distance between soundings.
Over 66 fathoms	E. or NE*	3 miles.
Between 60 and 66 fathoms.....	SE. by E	12 miles.
Between 55 and 60 fathoms.....	S. or SE†.....	6 miles.
Less than 55 fathoms	S. or W‡.....	3 miles.

* Steer NE. if certain of being south of the parallel of Penmarc'h.
† Steer SE. if certain of being south of the parallel of the Chaussée.
‡ Steer S. if certain of being south of the parallel of the Chaussée, sounding every 5 miles.

*An increase in the height of the swell is an almost certain indication of approaching the Chaussée. If a change in the state of the sea does not corroborate the soundings, the latter should be watched carefully for an error.

TABLE IV.

Soundings reduced to low water.	Nature of the bottom.	Courses to be steered, (true.)	Maximum distance between sound'gs.
Over 60 fathoms	Whatever it be.....	NE	3 miles.
Between 55 and 60 fathoms.. {	Mud	NW	5 miles.
Between 49 and 55 fathoms.... {	Any but mud	NW. or N ⁴	3 miles.
Between 44 and 49 fathoms.. {	Whatever it be.....	WNW.....	5 miles.
Less than 44 fathoms	Mud	WNW.....	5 miles.
	Any but mud	W	3 miles.
	Whatever it be.....	WSW	3 miles.

* Steer north if certain of being west of Penmare'h.

These rules are given principally for the guidance of steamers, though, of course, there may be times that they may prove of use to sailing-vessels. Whatever be the class of vessel, if the night be so dark as not to be able to see if the lead-line tends up and down, or otherwise, it would be advisable to lie-to, with the ship's head off shore, until daylight, or until it becomes less thick, as considerable accuracy is needed in the soundings, particularly in adopting the rules embraced in tables Nos. III and IV.

Caution.

A mere casual glance at the rules may impress one with the idea that they are of no great *practical* worth ; but a very little study of the matter will prove their reliability, and will convince the navigator that with an accurately-marked lead-line, and a good quartermaster, he can keep the ship clear of all danger, without waiting for it to break away to leeward.

The Raz de Sein, the channel between the Pointe du Raz and the Chaussée de Sein, is 1½ miles wide, with depths of 11 to 21 fathoms. Off the southern entrance are several shoals, described in the early part of this chapter.

Raz de Sein.

The tidal currents, flowing through the Raz de Sein, are very swift during spring-tides, and set right on some of the rocks, notwithstanding which it is not generally considered very dangerous ; the coasters use it whenever the weather will permit.

Currents.

The current of the flood at springs runs sometimes 9 knots, and at neaps 3 knots. This current is formed of two branches, one coming from the south-southwestward, over the Pont des Chats, and running to the north-northeastward between La Vieille and Tevennec, and the other coming

Flood-tide.

from Audierne bay, rounding La Vieille, and setting to the north-northeastward. This is the early flood; after the second hour the current increases in strength and sets north on Les Barillets.

Ebb-tide.

The current of the ebb comes from the north-northeastward and runs right for the Pont des Chats; a small portion passing near La Vieille runs out SSE. after having rounded it.

Directions.

The experience of pilots, coasters, and others shows that whether going southward or northward, the best course to follow through the Raz de Sein is to pass close to La Vieille, (not less than 300 yards in the SW. to clear La Plate.) afterward heading NNE. or SSE. One great advantage in so doing is that the danger is averted of being swept on Les Barillets during the flood-tide, or the Pont des Chats during the ebb, as might happen to a vessel venturing in mid-channel. The current sweeping round La Vieille carries a ship along on her course, which is well worthy of consideration if under half-steam power, or if the breeze be light. Being near a prominent mark, like that rock, also defines a ship's position; otherwise a captain would be compelled to rely upon frequent compass bearings, and the unreliability of such taken with the compass-card constantly moving, the necessity of having the chart on deck, whether it be raining or not, and lastly the little time to be lost in plotting, with the ship going sometimes 18 knots over the ground with the wind and tide, are very evident disadvantages.

For ranges to pass between the shoals at the southern entrance, see beginning of chapter.

At night.

The establishment of La Falaise light on the Bec du Raz has greatly simplified the passage of the Raz at night. As it only shows between the plateau of Tevennec and the rocks off Pointe du Van in the northward, it follows that a vessel can steer for or from the Pointe du Raz on any course that will keep *both* lights visible on that point. Should La Falaise light be suddenly obscured, the bearing of the other will immediately tell whether to steer to the eastward or westward to sight it again.

With regard to doubling La Plate shoal, La Falaise light in line with that of Bec du Raz gives the time to change course to the northeastward or southeastward. The former

light will be seen a few moments before the range is made, as it illuminates the space between the SW. edge of Tevennec plateau and Cornoc-Bras. It is obscured from the southward to prevent any danger of its being confounded with Tevennec light.

The northern limit of the *red* sector of Tevennec light lies in such direction that at whatever point that sector be entered from the northward, the ship's head may be laid for l'Ile de Sein, with the sole condition that *both* lights on the Bec du Raz be visible at the time of shaping that course. The peculiar excellence of that disposition of the lights is that it makes the navigator independent of the compasses, which are unreliable in themselves with the vessel sheering about in a strong tide-way, and the course by which varies with the point of departure.

The western limit of the *white* sector of Tevennec light lies in such direction that the pilot by remaining within it is never in the western part of the channel. It would be better perhaps were the *white* ray visible from a little nearer to La Vieille; as it is, while in the *white* sector, it is advisable to keep near the limit of the *red*, the dividing-line being well clear of the rocks.

The *white* ray of Tevennec light seen from the southeastward, shows over Masclougréitz rock; as there is never less than 5 fathoms on it, vessels of moderate draught need never fear it; but large ships would do well to avoid it, according to the following directions.

Directions.

If going northward with the flood-tide, bring Bec du Raz light to bear between N. 40° E. and N. 10° W., and steer for it. On entering the *red* sector of Tevennec light, steer for it until Ile de Sein bears between W. by N. and WNW.; head for the latter, and when Tevennec shows *white* again steer for it. La Falaise light will be seen, and when it comes in range with the Bec du Raz light, port the helm to re-enter the *red* sector of that of Tevennec, steering E. by N. to NE., according as the speed of the current is greater or less in proportion to that of the ship; the object is to make a course good of NE. If La Falaise light be still visible on entering the *red* sector of Tevennec, keep on to the northeastward, and when it is obscured watch for it to show again in the S. 40° E., when steer away to the north-north-

Going north.

westward in the space illuminated by *both* lights on the Pointe du Raz.

Caution.

If La Falaise light be hidden before entering the *red* sector, it will show that the ship has been carried too far to the northward by the current, and instead of running to the northward and eastward, it would be necessary to run east, or even E. by S. if the ship be moving slowly through the water, to sight it again bearing S. 40° E.

Going south.

Going southward with the ebb-tide, steer for Le Raz light about SE. by S., keeping both lights on that point visible until Tevennec light shows *red*, when head for Ile de Sein light. On entering the *white* sector of Tevennec, change course to SSE. When the two lights on the Pointe du Raz come in line, steer to the east-southeastward until Tevennec light shows *red* again. The course may then be shaped SE. by S. Ile de Sein light bearing WNW., indicates that the ship is clear to the southward of all the shoals.

Passing over
Masclougréitz.

If, from the stage of the tide, the draught of the ship, or the state of the sea, Masclougréitz need not be feared, the directions are simplified correspondingly. Bound north, on entering the *white* sector of Tevennec, (while steering for Bec du Raz light between N. 40° E. and N. 10° W.,) the ship may remain in it until off La Plate, (the two lights on the Pointe du Raz in line,) instead of keeping on until it shows *red*. Bound south, when Tevennec light shows *white* in the NNW., it may be kept so until that on Ile de Sein bears WNW., instead of running to the east-southeastward to enter the *red* sector.

Caution.

A vessel should never attempt to run through the Raz de Sein with a fresh breeze against a strong current. It is dangerous for steamers to run with a strong current when the wind blows hard in the opposite direction. During neap-tides a sailing-vessel could stem the current with a good breeze. It is out of the question to beat through against the tide, and it is dangerous to do so under any circumstances.

Anchorage.

There are several anchorages in the vicinity of the Raz de Sein, where vessels can come to under different circumstances. They are as follows:

The Baie des Trépassés, 4 or 5 cables from the beach, in

11 fathoms, over fine gray sand. If bound through the Raz de Sein, get under way 1 hour before high water ;

Northeast 1 mile from Tevennec rock, in 20 to 28 fathoms over broken shells ;

North of Ile de Sein, with Le Tevennec bearing E. by N., in 24 fathoms, over gray sand and broken shells ;

One mile south of Ar Gerveur, which is south of Ile de Sein, in 9 fathoms, over rock, gravel, and broken shells. A ship losing her sails in a SW. gale might come to there, bend new ones, and then run through the Raz. The current is feeble, and with a SW. wind the sea is less heavy than elsewhere.

It is not compulsory to take a pilot for the Raz de Sein, Pilots. but it is generally advisable to do so if possible. They will be met off Audierne, or to the southward of the Ile de Sein. There is no danger in lying to for one at 2 miles from the latter, as the currents are not strong, and run ENE. and WNW. It is only south of Kélourou, a rock off the SE. extremity of the island, that they set NNE. and SSW.

The pilots cannot always board a ship. They cannot reach a vessel S. of the island during spring flood-tides ; during neaps they can. Their boats generally lie aground until the half-flood, but they can be launched if necessary. A sailing-vessel arriving off the southern entrance of the Raz, may heave to or lie off and on $3\frac{1}{2}$ miles S. of Les Chats, take a pilot, and go through with the early flood.

Between the Pointe du Van and Cap de la Chèvre, 9 miles Douarnenez bay. NE. of it, is the entrance to Douarnenez bay, which extends in 10 miles to the eastward of the meridian of the latter, with depths decreasing from 18 to $7\frac{1}{2}$ fathoms, over sand, fine shells, and mud. It is about 8 miles in width, N. and S., inside Cap de la Chèvre.

From the Pointe du Van the south coast of the bay run- South shore. ning E. by N. 16 miles to the township of Douarnenez, is extremely indented ; it is steep to with a very few outlying rocks, most of which show at low water. The most impor- Shoals. tant of these are Douellou, Danou, and Grand Crom, to the northward and eastward of a little inlet 5 miles from Pointe du Van. The first is the outermost, and is a half-mile off shore.

The shore of the head of the bay, $6\frac{1}{2}$ miles in extent, Eastern shore.

trends northward from about 1 mile E. of Douarnenez, and is formed of three sandy beaches, separated from each other by points Tréfentec and Lanvillau, which latter is $3\frac{3}{4}$ miles from Douarnenez, and is 1 mile in extent. At two-thirds of a mile from these beaches are depths of $5\frac{1}{2}$ fathoms.

Northern shore. The NE. shore runs WNW. and is 7 miles long, formed of high lands occasionally projecting out into the bay, separated by several small beaches. The shore then bends suddenly to the southwestward for 4 miles, terminating in the Cap de la Chèvre, on which is a semaphore.

Basse Vieille. The principal danger met in entering Douarnenez bay is the Basse Vieille, $2\frac{3}{4}$ miles SW. $\frac{1}{2}$ W. from Mencos, a rock always showing above water, touching the easternmost point of Cap-de la Chèvre. It dries $5\frac{1}{4}$ feet, and is marked by a black buoy on the southern edge. The entire shoal is 3 cables in extent to the eastward and southward of the head that uncovers.

Chaussée de la Chèvre. Off La Chèvre cape, extending $1\frac{1}{2}$ miles to the SW., is the Chaussée of the same name. The sea breaks almost constantly on it, and the white water extends at times out to La Vieille; but in fine weather, or with the wind off the land, a vessel can pass at 1 mile from the point, with $6\frac{1}{2}$ fathoms at low water.

Basse Laye. Of the other shoals immediately to the eastward of the Chaussée the outermost is the Basse Laye, covered by 1 foot of water, two-thirds of a mile S. of Mencos.

Dangers in the bay. The other dangers are principally confined to the northern part of the bay, about 4 miles northeastward from the northern point of entrance.

Pierre Profonde, the first, is a rock which never covers; half a mile ENE. from it are Les Verrès, the northernmost head of which is also above water. These latter are two-thirds of a mile SSW. from Laber rock, just south of the large islet of the same name, not easily distinguishable from the main-land, and on the top of which is a guard-house. To the northward of Pierre Profonde are, successively, Le Taureau, which dries 5 feet, 3 cables from it; Basse Rip, half a mile beyond, covered by 5 fathoms; and, finally, NW. from Laber rock is a $3\frac{1}{2}$ -fathom patch.

Morgat anchorage. Morgat anchorage, in the NW. corner of Douarnenez bay, is to the southward of the point of the same name; the depth

at 3 cables from shore, is $5\frac{1}{2}$ to 6 fathoms, over sand. The best ranges for coming-to, are the guard-house on Bellec point, in the east, over Les Verrès rocks, and Crozon steeple, which is quite lofty and black, in the northward, open to the right of Morgat point. Vessels hold on well, except with the wind to the southward of SW., when the sea quickly becomes very high.

A little to the southward of these cross-bearings, between Pierre Profonde and Saint-Ternot (or La Chaise) point, is where the French squadrons sometimes anchor.

Just inside the Cap de la Chèvre, half a mile north of Mencos, is good anchorage in l'Anse Saint-Nicolas, in 4 to 7 fathoms, over sand.

For anchoring in the open bay there will be found $13\frac{1}{2}$ fathoms water, with mud and rock bottom, on the meridian of the Pointe de la Jument, 2 miles westward of Léidé point; and 11 fathoms, mud bottom, on the line from Tristan island to Bellec point, N. by E. from the light. Farther to the eastward the bottom is rock.

At 14 miles from Pointe du Van is the high point of Léidé, $1\frac{1}{2}$ miles ESE. of which is the village of Douarnenez. The shore in front of the town runs south for several hundred yards, and then off to the eastward, joining, at 1 mile distance, the beach of l'Anse d'Arvéchen, which extends $2\frac{1}{2}$ miles N. by E. There is a little harbor, protected by a jetty extending 190 yards eastward from Rosneur point. As many as 500 small vessels fit out there for the fisheries. For vessels of heavy draught there is fair anchorage in 5 fathoms water, over sand and mud, with Plouaré steeple (on a height 1 mile inland) bearing SSW., and Tristan island light WSW.

The population of Douarnenez is about 5,500.

Population.

Tristan island is off the mouth of the small river of Poul-davi, which has entrances on either side of the island, practicable at high water by vessels drawing $10\frac{3}{4}$ feet. The island is about 380 yards in extent, NNW. and SSE., and lies $4\frac{1}{2}$ cables from Rosneur point, on which is a signal-station. It is high and tolerably steep-to, depths of 12 feet being found 30 yards off.

Tristan island.

On Tristan island is exhibited a *fixed white*, dioptric, fourth-order light, elevated 115 feet above sea-level. The tower,

Tristan island
light: Lat. 48°
 $06' 16''$ N.; long.
 $4^{\circ} 20' 22''$ W.

which is round, with keeper's dwelling attached, is 31 feet in height. The light is visible 10 miles in all directions except toward the southward to northwestward, in which directions the rays are intercepted by Léidé point.

Life-boat.

A life-boat is stationed here.

Jetty-light:
Lat. $48^{\circ} 05' 49''$
N.; long. $4^{\circ} 19' 25''$ W.

On the extremity of the mole extending from Rosmeur point is a white iron post, showing, at an elevation of 23 feet above sea-level, a *fixed red*, dioptric, fourth-order light, visible 5 miles.

Semaphore.

On Rosmeur point is also a signal-station, with white dwelling. The geographical number is B. R. S. L.

Rocher de l'
Hermitage.

At 700 yards ESE. from Tristan island, and 1 cable from Rosmeur point, is the Rocher de l'Hermitage, an islet, at 60 yards off which are depths of 16 feet. Between it and the larger island are $14\frac{1}{2}$ feet over soft mud.

A vessel of moderate size, caught near this end of the bay in a NW. blow, could, after passing Léidé point at 1 mile, steer for Tristan island as soon as the light-tower is seen to the right of Plouaré steeple SE. by S., pass 330 yards eastward of the island, and come to $1\frac{1}{2}$ miles beyond, near the extremity of the mole, in 16 feet at lowest spring-tides.

Shoals.

About half a mile NE. by E. from Léidé point is the Basse Meur, covered by 17 feet of water; midway between the latter and Tristan island, 3 cables from either, is the Basse Neuve, comprising two heads, on the shoalest of which is a depth of only $8\frac{1}{2}$ feet. Between them and the Tête Saint-Pierre, 250 yards to the southwestward, is a channel 5 to 6 fathoms deep, on the range of Plouaré church, one-third way from Tristan island to the west point of entrance to Pouldavi river.

Tides.

It is high water, full and change, at Douarnenez at $3^h 34^m$. Ordinary springs rise 19 feet, neaps $13\frac{3}{4}$ feet.

Directions.

Douarnenez bay is easy of access, and, on the approach of bad weather it is sometimes preferable to run in for Morgat anchorage or l'Anse Saint-Nicolas to making Brest roadstead. The only important danger is Basse Vieille. The best range for entering and clearing the latter in the southward is Locrenan mountain (inland from the southern end of the head of the bay) a little open to the southward of Léidé point. On advancing into the bay this mountain will

appear well cultivated, and the village on its side large and surrounded with trees.

In hazy weather Plouaré steeple is the most conspicuous landmark, and may be steered for E. $\frac{1}{2}$ S., skirting the south shore at half a mile distance after passing Douellou and the other rocks in its vicinity.

To avoid the Basse Jaune, off Pointe du Van, keep $1\frac{1}{2}$ miles off shore until half a mile east of the meridian of the point. Coming up through the Raz de Sein, distance is saved by passing south of it, with Brezellec point open to the northward of Pointe du Van; the former point may be safely approached to within one-fourth of a mile, increasing that distance to three-fourths of a mile to clear Douellou.

The name of Iroise is given to the space comprised between the Cap Sizun and the Chaussée de Sein in the S.; Ouessant and the islands between it and the main-land in the N.; and the coast of the promontory separating Brest and Douarnenez bays in the E. This gulf, as it may be called, is 15 miles in extent N. and S. from the Chaussée des Pierres Noires to the Chaussée de Sein, and 14 miles E. and W. from Toulinguet point to the meridian of the western extremity of the former Chaussée. The southern half of this large space is free of dangers, so that a vessel coming in from the westward, after sighting Ile de Sein, can head in E. for Douarnenez bay, with nothing to look out for except the shoals extending two-thirds mile to the northward of Tevennec light-tower. Farther N. the shoals commence at 7 miles westward of Toulinguet point.

L'Iroise.

The land of the promontory separating the bays of Brest and Douarnenez is high and steep, and the western portion consists of three peninsulas, terminating, respectively, in the Cap de la Chèvre, Toulinguet point, and Pointe des Espagnols.

From the Cap de la Chèvre the seaward coast of this promontory runs about N. $\frac{1}{2}$ W. 4 miles, to the Pointe de Dinant, which is high, perpendicular on the N. side, and forms the southern extremity of the little bay of the same name. This coast is clear of dangers near shore, but at a little distance out are three rocks, Le Bouc, Le Chevreau, and La Chèvre, which remain awash at the highest spring-tides. The first bears NW. by W. $\frac{1}{4}$ W. rather more than $2\frac{1}{2}$ miles

Coast.

Shoals.

from the western extreme of cape La Chèvre. The other two are respectively $1\frac{3}{4}$ miles SW. by W. $\frac{1}{2}$ W., and 1 mile WNW. $\frac{3}{4}$ W. from the southern extremity of Dinant point. An islet, named Guénéron, lies one-fourth mile out from the beach, with no passage inshore of it except for very small craft. About $2\frac{2}{3}$ miles from La Chèvre cape is the little headland of Lansmarc'h.

Anse de Dinant.

L'Anse de Dinant extends in $1\frac{1}{4}$ miles to the east-north-eastward to the low-water mark on the beach at its head. It is very regular in shape, the width being $1\frac{1}{4}$ miles from the southern point of entrance to the Pointe de Portzen in the NNW. The bottom is sand, with depths of $4\frac{1}{4}$ fathoms. There are a few rocks off Dinant point close inshore, and a small cluster that remain awash at 55 yards from Portzen point. The bay offers but few advantages to seamen, as the westerly swell is continually heaving in.

Anse de Penhir.

At three-fourths mile from Portzen point is that of Tavelle, to the westward of which is l'Anse de Penhir, a small bay extending in one-half mile to the northward, and 1 mile wide to the Tas de Pois, off Penhir point, which latter is quite high and cragged, and otherwise distinguishable by a signal-station and a battery. In the western part of the bay, 2 cables from the semaphore, the bottom is sand at 5 fathoms, but in the eastern part it is rocky. The shelter is good from N. to W. winds, but in case of a shift to the southward the ship would be in danger.

Tas de Pois.

The Tas de Pois are four enormous rocks extending 7 cables to the southwestward of Penhir point, and close alongside of which the water is very deep. There are among them several smaller rocks, of which La Fourche never covers, and is immediately inshore of the westernmost. Small vessels coasting along in a fog generally try to make them, because of their being so high and steep-to. At one-half mile ESE. $\frac{1}{2}$ E. from the outermost is the Basse de Dinant, covered by 8 feet.

Toulinguet point.

Between Penhir point and that of Toulinguet, $1\frac{3}{4}$ miles N. by W. from it, the coast forms still another small bay, the northern half of which is bordered by a sand-beach. There is anchorage in $8\frac{1}{4}$ fathoms over sand, but the sea is almost always very heavy. Toulinguet point is steep and cliffy, about 125 feet high, and bordered by a ledge of sunken

rocks running out a long cable, only separated by a narrow channel, of $4\frac{1}{4}$ to 6 fathoms depth, from a large rocky shelf, called Le Toulinguet.

On Toulinguet point is a square tower 39 feet high, with a dwelling attached, exhibiting, at an elevation of 161 feet above sea level, a *fixed red*, dioptric, fourth-order light, visible 7 miles.

Toulinguet
light: Lat. 48°
 $16' 50''$ N.; long.
 $4^{\circ} 37' 54''$ W.

A life-boat is stationed on the point, but is generally launched in Camaret bay.

Life-boat.

The principal of the dangers in the Iroise are those extending W. by S. from Toulinguet point; they border in the south the route of vessels entering Brest roadstead. There is also another range of shoals forming an extension of the Tas de Pois in the SW. by W.; of these the Basse de l'Iroise is the outermost. It is a small plateau, the shoalest spot of which (at 4 fathoms) is in the NE. part, $9\frac{1}{2}$ miles westward from the coast midway between Cap de la Chèvre and Dinant point.

Dangers in the
Iroise.

Basse de
l'Iroise.

The Basse du Lis, the head of which is covered by 5 feet of water, and marked by a red buoy anchored 160 yards westward of the rock, is about 3 cables in extent, and 4 miles SW. by W. $\frac{3}{4}$ W. of the Tas de Pois. Between it and the Basse de l'Iroise is a channel $2\frac{1}{2}$ miles wide and 23 fathoms deep.

Basse du Lis.

At $1\frac{3}{4}$ miles ENE. from the Basse du Lis, and about the same distance from the Tas de Pois, is the Basse Ménéhom, which is three-fourths mile in extent NE. and SW., with three heads covered respectively by $13\frac{3}{4}$, $23\frac{1}{4}$, and $13\frac{3}{4}$ feet. At one-half mile NE. by E. from it is a 6-fathom patch surrounded by depths of 9 to 15 fathoms, called Basse Poulmacote.

Basse Méné-
hom.

Of the shoals off Toulinguet point, the outermost is La Vandrée, 1 mile in extent ENE. and WSW., covered by 11 fathoms except in the NE. extremity, where there is a little patch of only $6\frac{1}{2}$ feet. This latter, which is $6\frac{1}{4}$ miles SE. by E. from Les Pierres Noires light, $6\frac{1}{2}$ miles WSW. $\frac{1}{2}$ W. from Toulinguet, and $4\frac{2}{3}$ miles S. $\frac{1}{2}$ W. from Saint-Matthieu light, is marked by a red buoy off the north edge. It is just outside the south edge of the visible sector of Les Capucins light.

La Vandrée.

The Basse de l'Astrolabe, covered by $27\frac{1}{2}$ feet, is three-

Basse de l'As-
trolabe.

fourths mile NE. by N. from the latter. It is just within the southern limit of visibility of Les Capucins light.

Le Goémant. Le Goémant, covered by 5 fathoms, is half a mile east from La Vandrée. Its presence is almost always betrayed by eddies or tide-rips, especially when the wind is fresh.

La Parquette. La Parquette,* which uncovers in the early ebb, is 2 miles ENE. from La Vandrée buoy. During neap-tides it remains awash. It can be skirted quite close in the north and the west, but at a short distance to the southward is a dangerous rock, and 160 yards east is another that uncovers; finally 3 cables east of it is the Basse de la Parquette, covered by $6\frac{1}{2}$ feet. It should not be attempted to pass among these different heads, (except in small craft,) but between them and La Vandrée is a channel 2 miles wide, and one $1\frac{1}{2}$ miles wide between them and l'Astrolabe and le Goémant.

Le Trépied. Le Trépied is a little cluster of rocks, 2 miles ENE. from La Parquette, one head of which dries 10 feet. It is marked by a red buoy 85 yards to the northward.

Le Louzaouennou. Le Louzaouennou shoal is awash at lowest springs; it is half a mile south of Le Trépied buoy, and $1\frac{3}{4}$ miles E. by N. from La Parquette. At 200 yards N. by W., and 300 yards S. by E. of it, are $3\frac{3}{4}$ and $3\frac{1}{4}$ fathom patches, respectively.

Le Corbeau. At two-thirds of a mile SE. from Le Trépied buoy is the rock of Le Corbeau, which uncovers $14\frac{3}{4}$ feet; two-thirds of a mile to the eastward of it is the Le Corbin or Léac'h-bras, which always shows above water, and is three-fourths of a mile W. $\frac{1}{2}$ S. from Le Toulinguet.

Currents in the Iroise. The tidal currents in the Iroise, when undisturbed by extraneous causes, are quite regular. In the centre of the space they have not much apparent strength, but their rapidity increases on approaching the openings of the Ouessant channels and the Raz de Sein. Their varying force, in consequence of the influence of winds, renders the navigation of the Iroise difficult in thick weather, and under such circumstances it is advisable to anchor when practicable. In general, the current of the flood sets north and that of the ebb south.

Winds. In the Iroise SE. winds are accompanied by fine weather,

* A stone tower-beacon of unfinished masonry is being built upon La Parquette.

as are the easterly breezes in the evening. If a SW., west, or NW. wind haul to SSE. with rain, it betokens the approach of bad weather; it afterward comes out from south. If a SW. wind spring up gradually from a calm, bad weather is brewing, but may not be experienced for several days.

Vessels coming from the Raz de Sein bound for Brest should make the following ranges as Crozon steeple approaches Lansmarc's point (NE. $\frac{3}{4}$ E.). Coming from cape la Chèvre, the course should be shaped WNW. for a vessel drawing 19 feet.

Passes among the rocks of the Iroise.

To pass outside La Vandrée, keep the eastern point of Béniguet island ($2\frac{1}{2}$ miles NE. from Pierres Noires light) between the two Bossemen. If the red buoy be made, it may be passed at 3 cables either to starboard or to port.

To pass between La Vandrée and La Parquette, keep Conquet light-tower open to the left of Penzers point, over Les Vieux Moines rocks. This range leads at 2 cables from La Parquette; to remain in mid-channel, keep the same light-tower over the left edge of Les Vieux Moines rocks.

To pass between La Parquette and Louzaouennou shoal, keep Conquet steeple or Lochrist mill in line with Saint-Merzan pyramid on the edge of the cliff.

Between the Basse Ménéhom and the Basse du Lis is a passage $1\frac{2}{3}$ miles wide. Conquet and Saint-Matthieu steeples in line lead through in mid-channel.

The pass of Le Corbeau is between that shoal and the three heads of Pont-Chou, 3 cables to the northeastward, and is $9\frac{1}{4}$ fathoms deep. To enter it, steer to pass 50 yards to the eastward of the former, afterward passing one-quarter way between it and Le Corbin. Coming from the southward, seek the pass with Petit Minou light-tower over Le Corbin, which is the highest of the rocks off Le Toulinguet; when the right edge of the outermost of the Tas de Pois comes on with the right edge of Le Pélen, keep the alignment, (astern,) or Bertheaume château may be kept in line (ahead) with a house that will be seen at the head of Bertheaume bay. The latter range is the more easily made and kept.

Passage du Corbeau.

The pass should only be entered with a steady breeze, as the constant westerly swell heaves on the rocks with the current. The bottom is rocky, and the anchors would not

hold ; pilots prefer the Toulinguet pass when the wind permits.

Passage du
Petit Léac'h.

The pass of Petit Léac'h runs to the northeastward, and is about 1 mile long, comprised between the black beacon of Petit Léac'h and two shoals adjoining it in the north, on one side, and Le Toulinguet, Pélen, and intervening rocks, on the other. The depth is $8\frac{1}{2}$ fathoms, and the least width 700 yards. Roscanvel mill, (on the peninsula of Kélernn,) NE. by E., over the northernmost rock of Toulinguet point, or the fort du Diable, over the same, lead through in mid-channel. The summit of the road to Paris, seen in the middle of the Goulet, or Porzic point barely shut in by Pointe de Cornouaille, may be taken.

Coming from the southward, bring Petit Minou light-tower open to the right of Le Pélen, passing, afterward, 1 cable to the westward of the latter, to make the above alignments. Coming from the westward, Toulinguet light-tower a little to the northward of the lower part of Toulinguet rocks, leads in clear to the northward of P'Iroise, Le Lis, and other shoals.

Running north and south, a vessel may pass 110 yards west of Le Corbin, between it and the Basse Pont-Chou. The currents are in the direction of the channel.

Passage du
Toulinguet.

The pass of Toulinguet is practicable for sailing-vessels bound in for Brest, with the wind between WSW. and SE., (through south,) and for those bound out, with the wind between NW. and ESE., (through north.) It is generally preferred to either of the preceding, because there is anchorage in the little bay of Toulinguet in case of being becalmed and set in by the heavy swell. In case of danger assistance would be promptly rendered by the life-boat or the guard-boat, warned from the signal-station, 1,300 yards southeastward of the light. The great danger in taking this channel is from the eddies, which are apt to catch a vessel's bows and sheer her inshore. Seamen in the vicinity also say that the sands near the shore are shifting, and a boat's crew might be drowned in trying to land.

The channel is between Le Toulinguet rock and the ledge extending from the point of that name, and in one place is only 500 yards wide, with depths of $4\frac{1}{2}$ fathoms and over. Coming from the southward and westward to take this

pass, Le Pélen must be avoided by keeping Pen-hir point nothing to the eastward of N. 87° E. until about 7 cables from it, after which follow the coast and pass one-quarter way between Toulinguet rock and point.

At 1 cable westward of Toulinguet point is a red tower beacon of finished masonry, surmounted by a staff 6½ feet high, carrying a ball, also painted red. This beacon is on La Louve rock, 55 yards S. by W. of which is another rock awash at low water.

Coming from the southward, keep Petit Minou light open to the left of that of Toulinguet.

If becalmed and set in by the swell, drop anchor in 8 fathoms, at 3 or 4 cables ESE. from Le Toulinguet rock. During the first two hours of both flood and ebb the currents run very strong NE. and SW.

Steamers generally take the pass between Le Pélen and Le Toulinguet rocks, it being half a mile wide and with few turnings. The Cap de la Chèvre touching the east edge of the outer rock of the Tas de Pois, leads through it. Coming from the southward, pass 3 cables eastward of Le Pélen, steering north, or making the range given. When Le Corbin bears WSW. everything is cleared. Coming from the northward, when the south end of Dinant beach is seen between the innermost and second of the Tas de Pois, the course may be shaped WSW. to clear Ménéhom and the other shoals, or to the southward with Petit Minou light-tower astern, a little to the left of that of Toulinguet.

From Toulinguet to Grand Gouin point, 1¼ miles east-northeastward of it, the coast is steep-to, and forms a small inlet, called Portz Naye, open to the northward, where boats can land.

The bay of Camaret, formed between Grand Gouin and Les Capucins points, is 2 miles wide at the entrance, NNE. and SSW., and extends in 1 mile to the south-southeastward, with depths of 5½ to 11 fathoms over sand, mud, and clay. It affords a lee from all winds except those from the N. and NW., which former blow very hard and frequently during the equinoxes and in the winter. In the fine season the prevailing winds are NW., NE. and SE. There are numerous batteries along the shore.

Camaret.

In the SW. corner of the bay, two-thirds of a mile from Grand Gouin point, is the village of Camaret, inhabited mainly by fishermen and frequented by coasters. The population of the place is about 1,500, and there is a comparatively extensive coasting-trade carried on, the exports consisting chiefly of potatoes and fish, and the imports of wood, salt, pit-coal, &c. The port is formed by a tongue of land several yards above high water, north of the village, projecting about 600 yards to the east-southeastward, on the extremity of which are a fort and a square, red tower, called the *château*, with ditch and drawbridge. Near them, in the west-northwestward, is the chapel of Notre Dame de Roch Madou.

Port.

Rocket-apparatus.

There is a rocket-apparatus at Camaret for sending a line to vessels aground. Its range is over 1,000 yards.

Directions.

Vessels entering Camaret bay may double Grand Gouin point at $1\frac{1}{2}$ cables, and afterward anchor in $4\frac{1}{2}$ to $6\frac{1}{2}$ fathoms water, with that point bearing WNW., and the *château* SW., or with Saint-Matthieu and Grand Gouin points in line, and Camaret church showing between the *château* and the chapel. There is a rocky patch 4 cables NE. by E. of the *château*, and 3 cables WNW. of Pointe Sainte-Barbe, (in the SE. corner of the bay;) the depth over it is 6 fathoms, but it should be avoided in anchoring.

Four chains have been stretched on the bottom in the bay. They are buoyed and will be caught by the anchors in case of dragging in a NW. gale. Vessels should come-to to the westward of them. There is a mooring-buoy eastward of the mole.

To enter the port steer SE. two-thirds mile after doubling Grand Gouin point, and then steer round the *château*.

Vessels driven ashore in a NW. gale should try to strike in the port, or in the middle of Stanc-ar-pratt or Vioc-Wen beaches, or near the southern extremity of Très-rouss, the largest beach.

Tides.

It is high water, full and change, at 3^h 36^m. Ordinary springs rise 19 feet, neaps $13\frac{3}{4}$ feet.

Pointe des Capucins.

From Pointe Sainte-Barbe, which is one-half mile E. by N. from the mole of Camaret, the eastern shore of the bay, or west coast of Kélernn peninsula, is steep-to and runs in a general direction of N. by W. 2 miles, to the Pointe des

Capucins, which is high and crowned by a battery, and is the southern point of entrance to the Goulet de Brest.

On this point is exhibited from the keeper's dwelling, ^{Capucins light:} which is 17 feet high, a *fixed white*, dioptric, fourth-order ^{Lat. 48° 19' 13''} light, elevated 207 feet above sea-level, visible 10 miles ^{N.; long. 4° 34' 59'' W.} when between the bearings of N. 80° E. and N. 60° E. This sector illuminates the clear space between Vandrée, Parquette, and Trépied shoals on the south side, and Beuzec shoal on the north. A ray of light is also thrown to the northward and westward on Les Fillettes in the Goulet.

The Goulet de Brest, leading into Brest roadstead, is ^{Goulet de Brest.} formed by the peninsula of Kélernn in the southward, and the coast between Petit Minou and Portzic points in the northward. It is somewhat over 3 miles in length and a little less than 1 mile in width in the narrowest part, which is between Pointe Robert and Fort du Délec. The general direction of the Goulet is NE. by E. $\frac{1}{2}$ E. and SW. by W. $\frac{1}{2}$ W., and the chain of rocks and shoals, extending in half its length from the outer entrance, runs parallel to the shores.

The southern shore of the Goulet from Pointe des Capucins to Pointe des Espagnols, the northern extremity of Kélernn peninsula, is $2\frac{1}{2}$ miles in length, convex, and somewhat broken by inlets and points. Due west, 55 yards from Capucins point is a large rock of the same name, like a turtle's back. Depths of 4 fathoms are found close to the outer edge. ^{South shore of the Goulet.}

At 3 cables NNE. from this rock is Kerviniou point, crowned by a battery, and 4 cables farther is the Fort de Cornouailles, the largest on this shore. About NE. by E., 7 cables from the latter, is Pointe Robert, at the foot of which is also a battery; and finally a short mile, E. by N., from the last is the Pointe des Espagnols, with a battery almost skirting the water's edge.

The E. coast of Kélernn peninsula then turns abruptly to S. by W.

The northern shore of the Goulet runs $3\frac{1}{2}$ miles ENE. ^{North shore of the Goulet.} from Pointe du Petit Minou to Portzic point.

On a rock off Petit Minou point, separated from it at high water, is a circular tower, 79 feet high, showing, at an elevation of 105 feet above sea-level, a *fixed white*, dioptric, third-order light, visible 14 miles. This and Portzic light ^{Petit Minou light: Lat. 48° 20' 12'' N.; long. 4° 37' 04'' W.}

in line lead to the entrance of the Goulet, clear of all shoals. At 220 yards, E. by N., of the fort on Petit Minou point, is a semaphore, and a little less than 1 mile farther is the large fort of Mengam, which can be seen of a very dark night. About three-fourths mile beyond, in the same approximate direction, is Délec fort, right on the shore, with extensive barracks inside. To the eastward of this work the coast forms a sandy bay, 500 yards wide, with depths of 13 feet, separated by the Pointe de Névent (sometimes called Vieux Délec from the old fort on it) from the adjacent bay of Sainte-Anne. Névent point is narrow and perpendicular. Sainte-Anne bay, which is four-fifths mile wide, terminates in the eastward in Portzic point; the bottom is sand, except in the eastern part, and the depths over 4 fathoms to within 700 yards of the shore; but it is a poor place to anchor, as it is not sheltered from the sea, and the currents of both flood and ebb set in it, rendering it very hard to work out. The strength of the ebb-tide from the roads bears on Névent and Délec points, and it is frequently necessary to anchor, when the breeze falls light, to prevent being drifted upon them. The same applies to Petit Minou point.

Portzic light:
Lat. $48^{\circ} 21' 30''$
N.; long. $4^{\circ} 32' 11''$ W.

On Portzic point is an octagonal tower, 108 feet in height, from which is exhibited a *white fixed* and *flash*, dioptric, second-order light, elevated 184 feet above sea-level, visible 17 miles. The flashes occur at intervals of 3 *minutes*, being preceded and followed by short eclipses, which do not appear total within 8 miles.

Between the fort and light-tower on Portzic point is a signal-station.

The rocks do not extend far from the point, but it should be given a berth of at least 150 yards.

The coast here trends to the northeastward very nearly 2 miles to the mouth of the Penfeld river, and is bordered by a sand-bank averaging 200 yards in extent from the shore.

Dangers in the
Goulet.

The dangers in the Goulet, with the exception of the Roche Saint-Jacques, which lies 100 yards from the shore, midway between Petit Minou point and Mengam fort, are confined to mid-channel, and form a chain a little less than a mile long, extending SW. from Mengam rock, which is

Roche Men-
gam.

very nearly abreast of the large fort of the same name. This rock is marked by a tower-beacon painted with six horizontal stripes, black and white alternately. Its bearings are Portzic light, NE. $\frac{3}{4}$ E., and Petit Minou light, W. $\frac{1}{2}$ S. It cannot easily be made out of a dark night, but Mengam fort will probably be distinguished, and when it bears NW. $\frac{1}{2}$ W. the rock is passed. The channel between the beacon and Cornouailles fort is 950 yards wide.

The outermost rock in the chain is the Plateau des Fillettes, 3 cables in extent E. and W., and marked by a black and red buoy (horizontal stripes) anchored on the western edge. The depth over the eastern part of the plateau is 13 feet at lowest water, but in the western part are two heads, which dry 4 and 5 feet respectively. The bearings of the latter are: the top of Liéval rock (off the west coast of Kélernn peninsula) over the western part of the large rock of Capucins, SSE. $\frac{1}{2}$ E.; the tower on Mengam rock on with the northernmost crevasse of Portzic point; or the Rocher de Plougastel, a greenish-gray mass seen over the land far away to the eastward, touching Batterie Robert, ENE. $\frac{1}{4}$ E.

Les Fillettes.

In beating up, to pass to the westward of Les Fillettes, keep Liéval rock well open to the right of Capucins rock. At night the ray of light thrown on it from Capucins point warns a vessel of its proximity.

At 1 cable NE. of the extremity of Les Fillettes plateau is a small spot covered by 26 feet at low water, and 1 cable farther is the Basse Goudron, 160 yards in extent NE. and SW. This bank has two heads, the one in the SW. part being covered by only 2 feet, and the other by 5 feet of water. Between the two is a depth of 7 fathoms. It is midway between Mengam rock and Les Fillettes, and a very little to the southeastward of the line joining the two. Its ranges are: Cormorandière rock (NE. of Espagnols point) touching Pointe Robert, ENE. $\frac{1}{2}$ E.; and Keraudren mill (seen at the head of Camaret bay) touching the western edge of Capucins rock; or the parapet of Mengam fort on with a little house at the head of the small inlet to the eastward of that fort.

Basse Goudron.

To pass between Basse Goudron and Les Fillettes keep a house on Tremet point (W. coast of Kélernn peninsula) visible to the eastward of Capucins light-tower, or the western

wall of Mengam fort end on. To pass between it and Mengam rock, $3\frac{1}{2}$ cables northeastward, keep the last little gray house, at the head of Mengam inlet, touching the right side of the fort, or Keraudren mill and another near it between Capucins point and rock. The beacon should not be approached nearer than 110 yards in the westward.

Basse Her-
mine.

Just outside the entrance to the Goulet, 1 mile SSW. of Petit Minou light, is the Basse Hermine, a rocky patch not to be avoided in ordinary weather, the depth over it being 9 fathoms; but in very heavy weather it would be well to steer clear of it. The depths to the southeastward are 12 fathoms and to the northwestward 24 fathoms. Portzic light-tower over Mengam rock beacon leads S., and Plougastel steeple (seen over the land east of the roadstead) on with Pointe Robert, N. of it.

There is also a 7-fathom patch 4 cables to the southwestward of Les Fillettes buoy, on the range of the latter and Mengam rock.

Caution.

Beating in, with a fair tide, do not pass less than 100 yards to leeward of any shoal, unless the breeze be strong and steady.

Currents in the
Goulet.

The tidal currents run strongly in and out through the Goulet, attaining a speed of 3 knots during springs.

Flood-tide.

The current of the flood-tide begins to make in front of Bertheaume bay 1 hour before low water. At $1\frac{1}{2}$ miles south of Pointe du Minou it lasts 5 hours, from the first hour of rise to slack water. In Sainte-Anne bay, during the first two hours, the current follows the windings of the coast, after which an eddy makes in the opposite direction, but only to the northward of the line joining Portzic and Névent points. Along the shore of Kélernn peninsula, from Grand Gouin point to Pointe des Espagnols, the current of the flood lasts 9 hours, from low water, and during springs, with westerly winds, the current is always setting in past Pointe Robert.

Ebb-tide.

Abreast of Bertheaume bay the current of the ebb is first felt 1 hour after high water. Between Bertheaume and Grand Minou points, after $2\frac{1}{2}$ hours of fall, an eddy makes to the eastward, round the head of the bay, as far as the latter point, where it branches off and joins the general current outside. This counter-current is only felt to the

northward of the range of the Rocher de Plougastel opening from Petit Minou point. At $1\frac{1}{2}$ miles south of the latter point the current of the ebb continues to run for 7 hours, from slack-water flood to 1 hour after low water. Between Petit Minou and Délec points, at half-ebb, an eddy makes to the eastward, extending 2 cables from shore. In Sainte-Anne bay the current sets right on Névent point. Between Grand Gouin and Espagnols points the duration of the current of the ebb is 3 hours, commencing after the third hour of fall.

At 1,030 yards west from Petit Minou point is that of Grand Minou, which is of no importance in navigation, and is often called simply Minou point. A large rock lies immediately off it, which may be approached to 1 cable by the largest vessels. The point is fortified, and a short distance in the northwestward is the large fort of Toulbroc'h. Pointe du
Grand Minou.

The coast from here runs into the northwestward, and, bending back to the southward to Bertheaume point, $2\frac{3}{4}$ miles west of Grand Minou, forms Bertheaume bay. The eastern shore is steep to and rocky, but the N. and NW. part of the bay is sandy and shoaler, the 5-fathom line being from one-half to two-thirds of a mile from the beach. Immediately off Bertheaume point is an islet, on which stands the château of that name, which is occasionally used in ranges. The bay extends in 1 mile, and afforded anchorage to French squadrons during their last war. The depths are 7 to 9 fathoms, over sand principally. The Basse Maturin, a rocky patch, 1 cable in diameter, covered by 6 fathoms of water, is 4 cables from the NE. shore, and $1\frac{1}{3}$ miles ENE. $\frac{1}{2}$ E. from the château. At 300 yards NE. from the château are 3 rocks, of which the innermost remains awash at high tide of ordinary springs. From there extends the beach, which, with a few rocky ledges, forms the head of the bay. Vessels sometimes anchor there for shelter from northerly winds; the favorite ground is east of the château. Anse de Ber-
theaume.

At two-thirds mile SW. from Bertheaume point is that of Créac'hmeur, recognizable by its extensive fort, and a semaphore one-fourth mile to the eastward. The coast between these two points curves inward somewhat and is fringed with rocks. The 5-fathom line follows the curve of Pointe de
Créac'hmeur.

the shore at a distance nowhere greater than 250 yards, but at one-quarter mile east of Créac'hmeur fort is a $4\frac{1}{2}$ -fathom patch surrounded by depths of 6 fathoms, over mud.

Les Rospects. The coast from this headland runs $2\frac{1}{4}$ miles, in a general direction of west, to Pointe Saint-Matthieu, and is clear of dangers with the exception of Les Rospects, four large rocks always showing above water, extending 3 cables S. by W. from the shore 4 cables east of Saint-Matthieu. The outermost of these rocks should not be approached nearer than 3 cables in the southward, as a sunken rock lies about 350 yards from it, with depths of $3\frac{1}{2}$ fathoms just outside.

Landmarks. A short distance eastward from Les Rospects is the Pyramide du Coq, on the edge of the cliff, and one-half mile farther is the fort of Saint-Merzan; inland of them are the Pignons de Kéravel, (2 white pyramids,) and still farther the church and the mill of Lochrist.

Pointe Saint-Matthieu. Saint-Matthieu point, the NW. extremity of the opening to Brest Narrows, is $6\frac{1}{4}$ miles N. 64° W. from Toulinguet point, the SE. extremity of the same. It is not very high, but recognizable by the light-tower, a ruined abbey, a semaphore a little to the eastward, and the white steeple of Le Conquet, which is nearly 2 miles north, but is seen in clear weather 6 miles outside Les Pierres Noires.

Saint-Matthieu light: Lat. $48^{\circ} 19' 50''$ N.; long. $4^{\circ} 46' 23''$ W. The light-tower is circular, with enlarged base, and is 82 feet high. The light, which is exhibited at an elevation of 177 feet above sea-level, is *white, revolving every half minute*. The illuminating apparatus is dioptric, of the second order. Range of visibility, 18 miles. The eclipses do not appear total within 8 miles.

Signals. Storm and weather signals are made from Saint-Matthieu point. Geographical number of station, B. G. N. W.

Vieux Moines. Les Vieux Moines, a cluster of rocks 300 yards in extent, uncovered during ordinary tides, lie SSW. of Saint-Matthieu point, the outside edge being half a mile from it. Three and a half fathoms can be carried between them and the land.

Le Coq. To the southward of the coast between Saint-Matthieu and Grand Minou points are two rocks which are rather dangerous to passing vessels. The farther to the westward is Le Coq, which dries $4\frac{1}{4}$ feet at lowest springs, and which is marked by a black buoy 60 yards from the eastern edge.

It is nearly two-thirds of a mile from shore on the following ranges: the Pignons de Kéravel in line with the white pyramid on the edge of the cliff, in the NW.; and Bertheaume château over the foot of Créac'hmeur point.

The SW. edge of Béniguet island open a little to the left of Les Rospects leads clear to the westward, and Béniguet shut in by Saint-Matthieu point to the eastward of Le Coq. Or the pyramid on the cliff open to the right or left of the Pignons, leads to the westward or eastward of the shoal. Coming in from seaward, when Bertheaume castle opens well from the land the danger is passed.

At $1\frac{1}{3}$ miles east of Le Coq is the Basse Beuzec, which plateau is 3 cables in extent NE. and SW., and the middle of which is $5\frac{1}{4}$ feet below lowest springs. Just east of that shoalest spot is a black and red buoy, which must be given a berth of 400 yards by large vessels. The ranges are: the left side of Bertheaume château just touching the point north of it; Saint-Matthieu light-tower on with the old semaphore. The shoal is about 2 cables to the northwestward of the range of Petit Minou and Portzic lights.

Basse Beuzec.

The extensive sheet of water forming the roadstead or harbor of Brest may be divided into two parts: the roadstead proper in the north, and the second roadstead, or Châteaulin river, in the south. The line dividing these two parts is that joining l'Île Ronde and the Pointe de Lanvéoc, which are $1\frac{3}{4}$ miles apart, bearing almost exactly north and south from each other.

Brest roadstead.

The roadstead proper is about $4\frac{1}{2}$ miles in extent, north and south, and $3\frac{1}{2}$ east and west, with quite regular depths, and but few banks excepting those bordering the shores in the NE. and SW. portions. Two rivers empty into it; the Penfeld, on the north shore, which forms the *port militaire* of Brest, and the Éloron, or Landerneau, in the NE. part. On the shores of the latter is the town of Landerneau, about 30 miles up; l'Anse de Kerhuon on the right bank, 5 miles from Brest, is the great naval timber depot.

The northern shore of the roadstead runs 2 miles in a northeasterly direction, from Portzic point to the mouth of the Penfeld, 600 yards east of which is the Port Marchand, at the western entrance to which are two lights.

Basin lights: The northernmost light at the end of a mole extending
 Lat. $48^{\circ} 22' 42''$ N.; long. $4^{\circ} 29' 14''$ W. (South light.) from the shore, is *fixed green*, dioptric, of the fourth order.

The other, shown from the end of a pier running parallel to the shore, is *fixed red*, elevated 33 feet above sea-level. Both are visible 7 miles, exhibited from white iron towers, 38 feet high, 235 yards apart.

Fog-bell. During fogs a bell is sounded at the southernmost tower; 14 strokes are given at intervals of 1 second; then, 6 seconds afterward, 1 double stroke; and after another pause of 6 seconds, 14 strokes again, and so on.

Light. From a battery on the west side of the entrance to the Penfeld, is exhibited a *green* lamp at night. The battery takes the name of Fer à Cheval, from its shape.

Banc de Saint-Marc. From the western entrance to the basin to point Sainte-Barbe, the north side of entrance to the Landerneau river, the distance is $3\frac{1}{2}$ miles. The point is rather low, and recognizable by a white wall extending to the end; the intervening coast is irregular, and bordered by the Banc de Saint-Marc, which mud and clay bank is covered by 2 to 6 feet of water, and extends 1 mile southward, and borders in the north the river channel, which is straight and quite deep, but very narrow.

Banc du Corbeau. This channel is limited in the S. by another mud-bank, which skirts the E. coast to a distance of two-thirds mile, from Corbeau point to the entrance of the river proper. It also extends along the coast southward of the latter point.

The $3\frac{3}{4}$ -fathom line off this bank is approximately on the range of Lanvéoc fort, touching the W. side of Ile Ronde. A small projection of the bank runs out 4 cables to the westward of this range, in the direction of La Cormorandière, open to the left of Pointe Robert.

The Pointe de l'Armorique is the southern extremity of the eastern shore of the Rade de Brest. The Banc du Corbeau terminates there, and Ile Ronde, 2 cables in the southwestward, may be approached to within 400 yards. On the point stands the fort of the same name.

Plougastel. A little over 4 miles to the northeastward of the Pointe de l'Armorique is the steeple of Plougastel, and, 1 mile WNW. of the latter, the Rocher de Plougastel, both of which landmarks are visible from outside the Goulet.

Western shore. The western shore of the roadstead comprises the eastern

shore of Kélerun peninsula, which, after running 3 miles to the S. by W., bends to the eastward and northeastward, terminating in Ile Longue, on the extremity of which is a fort. The bay inclosed by this curving coast is $2\frac{1}{6}$ miles wide between the two points of entrance, but it is very shallow, there being but one navigable channel in it leading to l'Ile de Trébéron.

To the southeastward of Ile Longue, which is a little over 1 mile in length, and about 3 cables in width, is l'Anse du Fret, which is $1\frac{3}{4}$ miles wide to the Pointe de Lanvéoc, and extends in to the southwestward $1\frac{1}{6}$ miles. Depths of 2 to 3 fathoms, over mud and clay, are found inside the line joining the extremities. Immediately outside are the 6 and 7 fathom depths of the roadstead, bottom of sand and mud.

Anse du Fret.

There are two banks in this little bay which should be avoided, being covered by not more than 6 or 7 feet. They are in the NW. and SE. parts, with a channel of $4\frac{1}{2}$ cables width between them, on the range of Corbeau fort, touching the left side of Ile Ronde.

There are three red buoys anchored, respectively, at 3 cables northward of Ile Longue, 5 cables from Lanvéoc, and 2 cables from Penarvir. They do not mark sunken rocks, but simply a stretch of $3\frac{1}{2}$ miles for trials of speed.

Distance-
buoys.

The only dangers in the roadstead that a vessel of ordinary size need avoid are far from her course to Brest.

Dangers in the
Rade du Brest.

At 375 yards NE. from Pointe des Espagnols is La Cormorandière, a rock which remains awash at ordinary springs. Close to it, N. by E. and S. by W., are a couple of small rocks which also uncover. The passage inshore is 1 cable wide, and deep enough for the largest vessels, but the tidal currents are very rapid in it. The course through is SSE. and NNW., keeping one-third way from the rock to the land, to avoid a 1-foot patch well inshore.

La Cormoran-
dière.

The Basse Fortunée is not a dangerous spot, being covered by 7 fathoms. It is one-half mile, NW. by N., from the fort on the extremity of Ile Longue, just inside the line from that fort to the Pointe des Espagnols.

Basse For tu-
née.

La Plate rock is between the latter shoal and the extremity of Ile Longue, and dries 11 feet. It is out of vessels' way, but should be looked out for; the French ship Du

La Plate.

Guesclin touched there some time ago. It is almost connected with the main-land by a ledge.

Basse du Renard.

The Basse du Renard, covered by only $9\frac{3}{4}$ feet at low-water, is a dangerous spot for vessels beating about in the roadstead. It is marked by a square red and black buoy, and lies three-fourths of a mile WNW. from Ile Ronde, on the following ranges: Le Chat mill (the highest in l'Anse du Fret) on with the SE. shore of Ile Longue; Délec fort (northern shore of the Goulet) midway between Cormorandière rock and Espagnols point.

Vessels bound for the Châteaulin river will avoid this shoal by remaining to the southward of the alignment of Délec fort and Espagnols point, or by keeping Névent point midway between La Cormorandière and the land.

To clear it in the N. do not let Délec fort open to the southward of La Cormorandière.

Basse de l'Ile Ronde.

The Basse de l'Ile Ronde, covered by $1\frac{3}{4}$ fathoms, and marked by a red and black can-buoy, is 500 yards NW. from Ile Ronde, and W. of the northern extremity of l'Armorique point. Its ranges are: the southern extreme of the latter point on with the little point a half-mile to the eastward, or on with the right edge of the Iles du Binde; Lanvéoc mill open a little to the right of the batteries under and to the right of Lanvéoc fort.

Banc de Saint-Pierre.

The Banc de Saint-Pierre, bottom of rock, covered by 7 to 9 fathoms water, except in three places, lies E. and W., on the parallel of Portzie point; it is $1\frac{1}{2}$ miles long with a breadth of not more than 4 cables, N. and S. Its edges are buoyed and a vessel in taking up a berth should avoid it, as the anchors would not hold. Its limits are: in the E. Saint-Sauveur steeple (in Recouvrance) on with the mast of the Observatoire des Élèves; in the W. Saint-Pierre de Guilbignon steeple (which is square and white, $1\frac{1}{4}$ miles N. of Portzie point) over the Batterie de Sept. There are three shoaler spots on the bank, which pilots avoid in conning large ships. They are as follows:

Basse Penou-
pèle.

The westernmost, Basse Penoupèle, covered by $28\frac{3}{4}$ feet, is on the range of the first of three houses to the right of Mengam fort, on with the point seen just to the left of Délec fort, and, in the northward, Brest church steeple touching the left edge of the Tour de César (small, in the

middle of the château), or, in the southward, Crozon church-tower touching the east angle of Ile Longue fort.

The second, Basse Saint-Pierre, covered by 5 fathoms, is ^{Basse Saint-Pierre.} 1 cable from the former, on the same E. and W. range, and with the masting-sheers on with the Tour de César.

The third, called Basse Leclerc, is covered by $6\frac{1}{2}$ fathoms, ^{Basse Leclerc.} and is a short mile eastward of the latter on the same range, and just S. of the NE. buoy. Its cross-range is Saint-Sauveur steeple on with the observatory mast.

There are four small banks to the northward and westward of the Banc de Saint-Pierre, the least depth over them being $3\frac{3}{4}$ fathoms. One is a half-mile ENE. from Portzie point. Mengam fort over the fort on Portzie point leads 100 yards to the southward of it. Two others farther N. are E. and W. of each other and of the mole of Quatre Pompes. Brest church-steeple on with the Tour de César leads between them. Large vessels intending to anchor outside the mooring-buoys should keep Mengam fort a little open to the southward of Portzie point to clear all these shoals. ^{Other shoals.}

It is high water, full and change, at Brest at 4^h 46^m. ^{Tides.} Ordinary springs rise 19 feet, neaps $13\frac{3}{4}$ feet. Equinoctial tides have risen $27\frac{3}{4}$ feet.

During the first two hours of flood-tide in Brest roads ^{Tidal currents.} the current runs from the Goulet toward the mouth of Landerneau river, but afterward bearing full on Corbeau point, it divides into two branches, one of which enters the river, while the other sets to the southward round Ile Ronde; with Petit Minou light open of La Cormorandière, the northeasterly set will be felt off Corbeau point. When Petit Minou point comes in range with that rock the ship will be carried to the SE., south, and SW. as she advances to the southward. ^{Flood-tide.} After rounding Ile Ronde this current follows the general direction of the stream of Châteaulin river, about on the range of Névent and Espagnols points.

A branch of the flood-tide sets to the southeastward inshore of La Cormorandière, which also divides, the larger portion flowing into the Châteaulin river. The other, striking the extremity of Ile Longue, flows into the Anse du Fret and the Baie de Roscanvel.

Between the Goulet and Landerneau river, south of Saint-

Pierre bank, the current of the flood lasts 9 hours, from the moment of low water to the half-ebb. On the bank the current runs regularly 6 hours to the eastward. North of the bank, in the anchorage, the current of the flood lasts 6 hours south of the alignment of Petit Minou and Portzic points, but only 3 hours north of that range. After 3 hours' rise an eddy current sets to the westward and southwestward along the shore to Portzic point.

During neaps the currents north of Saint-Pierre bank are very feeble; slack water often lasts 4 and 5 hours.

Ebb-tide.

Between Ile Ronde and the mouth of the Landerneau the current of the ebb is not felt. On the Banc de Saint-Pierre, after turning through north and NW. it sets west for 4 or 5 hours, with little strength generally.

Guard-boat.

The guard-boat remains at anchor off the entrance to man-of-war harbor, and flies a white and blue cornet at the mast-head.

Mooring-buoys.

The mooring-buoys for men-of-war are 1 mile eastward of Portzic point, and extend $1\frac{1}{4}$ miles off shore. In the eastward they extend to south of the Port Marchand light-towers. They are anchored 300 yards apart, and it is forbidden for vessels to take a permanent berth to the northward of them. No. 14, the westernmost, 1,100 yards east of Quatre Pompes, is reserved for the ocean steamers.

Compass station.

The compass-buoys are off Lauberlac'h bay, 1 mile to the eastward of Ile Ronde, in $6\frac{1}{2}$ fathoms water.

Quarantine ground.

The quarantine ground is in Roscanvel bay. The ocean steamers come to 1 mile E. by S. of La Cormorandière. The bottom throughout the bay is mud. The ranges of the anchorage ($8\frac{1}{4}$ fathoms over mud and clay) are Portzic light over La Cormorandière, and Lanvéoc fort opening from Ile Longue.

Anchorage of the Lazaretto.

To go from this anchorage to that of the Lazaretto, keep Kélernn mill (at the head of the bay) on with the northern extremity of the structures on l'Ile aux Morts, (the SW. island.) The channel is 1 mile long and 400 yards wide, with depths of 5 to 8 fathoms over soft mud. Come to on the leading range, with Le Chat mill on with the south end of Trébéron island, and the extremity of Ile Longue on with the northern end. On Trébéron island is the powder-maga-

zine. On l'Ile aux Morts is the Lazaretto. Between the two is a mooring-buoy.

The anchorage of Brest roads is comprised between the following ranges: For the northern limit, the tower-beacon on Mengam rock on with Portzie point; the southern, Mengam fort opening from Portzie point; the eastern, Saint-Sauveur steeple on with the flag-staff on the point of the Parc au Duc, (a large coal-yard;) the western, the steeple of Saint-Pierre off the left side of the Batterie de Sept. For large vessels the best range is Délec fort on with Portzie point.

Anchorage of
the roads.

The pilots' licenses include from the Raz de Sein to Ouessant island and outside Le Four. They can take vessels as far as Plougastel passage in the Landerneau river, and up all the rivers of the Châteaulin roads. Vessels of less than 80 tons burden are not compelled to take a pilot.

Pilots.

Directions for making Ouessant are given page 481; for avoiding the Chaussée de Sein, page 420; for the passage of the Raz de Sein, page 424.

Approaching
Brest.

In the day-time with clear weather the navigation of the Iroise is simple enough. Vessels coming from the southward, after doubling the Chaussée de Sein should steer NE. for Saint-Matthieu point to make the alignment of Petit Minou and Portzie lights, leading to the Goulet. Coming from the Raz de Sein, the course may be shaped to take one of the passages between the shoals off Toulinguet point, (directions given page 435;) or the vessel may steer NNW. to clear La Vandrée, afterward heading for Saint-Matthieu point to make the range leading in. In misty weather, vessels leaving the Raz de Sein generally try to make the Tas de Pois, because of their being so high and bold. The course to them is NNE. $\frac{1}{2}$ E.

Directions.

From the soundings that have been made in the Iroise, the following two facts may prove of use to the navigator:

Soundings in
the Iroise.

1. When the lead reveals a sudden change from bottom free of mud to mud, the ship is on the meridian of Les Pierres Noires, or 5 miles from that of La Vandrée.

2. When a sandy bottom, spotted with grains of mica, is brought up, the ship is in such position that any course between NW. and ENE. might put her on the Chaussée des Pierres Noires.

The rocky bottom in the Iroise is limited in the north by the micaceous sand, and in the west by the 33-fathom line, which runs very nearly along the meridian of Ile de Sein. This region is as noticeable from the irregularity in the soundings as from the nature of the bottom. There have also often been found there large black or yellow gravel, broken shells, and, in the clefts of the rocks, even a little mud, but never any sand speckled with mica, so there will be no doubt when the latter bed is reached, while running north.

Caution. The mica differs in appearance from any other black specks that may appear in the sand by its metallic lustre. The specimen brought up has to be examined carefully to perceive this distinction.

The Goulet. It is generally preferable to take the channel south of the shoals in the Goulet, as the tide is more favorable. Either shore may be approached to 1 cable.

The roads. Arriving in the roads keep Petit Minou light-tower a little open to the southward of that of Portzie point, to come to outside the mooring-buoys in $4\frac{1}{2}$ to 5 fathoms over sand. Or the anchor may be let go south of the lamp-post of the Fer à Cheval, with Mengam fort on with Portzie; the depths there are $6\frac{1}{2}$ fathoms, sand and mud bottom, 1 mile from the entrance to the Penfeld.

Vessels drawing 23 feet and intending to enter the Penfeld, can head in with Mengam rock touching Portzie point until Brest church tower touches the left side of the château, a sombre edifice with towers. They will then be in 5 fathoms water, one-fourth mile from the Fer à Cheval, and can anchor temporarily.

Caution. Be careful in coming to not to foul the chains of the mooring-buoys.

Vessels bound for the Port Marchand should steer on the last range for the entrance, and on approaching give the southern jetty a good berth, as there is not much water off it in its prolongation to the westward. Red buoys, Nos. 2, 4, 6, and 8, are passed to starboard, and buoys Nos. 1, 3, 5, and 10 to port.

If bound for the Châteaulin river, double La Cormorandière at a good cable's length, or pass between it and Espagnols point, heading SSE., and steer to the southward

of Ile Ronde, with Délec fort shut in by Espagnols point, to avoid the Basse du Renard. This course will lead about 100 yards from Ile Ronde; or, Névent point may be kept astern, showing midway between Espagnols point and La Cormorandière. The most expeditious way of getting a pilot in the roads for the river, is to heave-to for one off Brest, in preference to waiting for one at Roscanvel, or in Poulmic anchorage, or S. of l'Armorique point.

To reach the quarantine-ground, after rounding La Cormorandière, steer S. $\frac{1}{2}$ E. $1\frac{1}{2}$ miles.

To enter the Landerneau or Éloron river, keep Délec fort just touching Portzic point until Brest church comes in line with the château, when a solitary tree, to the left of some woods in the northern part of Kélern peninsula, should be kept in line with the slope of a point between those of Robert and Espagnols. This range leads up to the entrance of the channel between Saint-Marc bank and Kéraliou or Corbeau bank. Off man-of-war harbor a pilot will board the ship to take her to Kerhuon.

At night, after doubling the Chaussée de Sein, steer NE. At night.
and Saint-Mattheu light will be made nearly ahead, and the *red flash* light of Les Pierres Noires will be seen off the port bow. Steer for the former, nothing to the northward of NNE., to avoid the Chaussée de la Vandrée. Petit Minou and Portzic lights will gradually approach each other, and should be steered for when in line ENE. If the ship be far enough to the eastward to enter the range of visibility of Les Capucins light before making the latter alignment, the course may be changed to the eastward immediately on sighting it, steering with Petit Minou light a little off the starboard bow.

Coming from the westward, it would be safe to pass 2 miles S. of Les Pierres Noires light, steering E. until Petit Minou and Portzic lights are in one.

As the two latter lights lead only 400 yards to the south-eastward of Basse Benzec, it is better to keep the latter (*fixed* and *flash*) a little to the right of the former, (*fixed*.) Caution.

When about two-thirds mile from Petit Minou light, port the helm to pass 2 cables S. of it, and follow the shore at about that distance, passing also 2 cables from Portzic light. A ray from Les Capucins light will show when the vessel is

abreast Les Fillettes, and Mengam fort, bearing NW. $\frac{1}{2}$ W., shows that Mengam rock is passed.

Caution.

In clear weather, the *red* light at the entrance to the Port Marchand is visible from outside the Goulet, but it cannot well be confounded with any other. On entering the Goulet it should be hidden by the land to avoid the shoals in mid-channel.

On entering the roads, steer away with Petit Minou light open to the southward of that of Portzic, and anchor $1\frac{1}{2}$ miles beyond, to the southward of the *green* lamp on the Fer à Cheval.

If the southern channel in the Goulet be taken instead of the northern, keep Capucins light visible, heading for it until three-quarters of a mile from it, when steer for midway between Pointe Robert and Portzic light, with the *red* light of the Port Marchand ahead.

If bound for the Châteaulin river, bring Portzic light astern NW., and steer away from it, anchoring to the southward of l'Armorique point until daylight.

Vessels intending to enter the Port Marchand generally anchor outside the mooring-buoys until daylight.

Beating in.

A vessel beating in against an easterly wind might gain a good deal by making a long board to the southeastward in the Iroise, coming up through some of the passes near La Parquette and adjacent shoals. Consideration of the stage of the tide should influence a captain considerably in determining what to do. The hours of high and low water are practically the same in the Iroise as at Brest. The pilots are very familiar with all the currents and eddies.

On approaching the meridian of Saint-Matthieu point, it may be approached to two-thirds of a mile. The Basse Vandrée is marked by a red buoy as the limit of the boards to the southward. The northern shore of the approaches to the Goulet may be approached anywhere to one-third of a mile except abreast Les Rospects, or at the head of Bertheaume bay, or off Grand Minou point.

Beating
through the Gou-
let.

Vessels beating through the Goulet will find the current of the flood-tide of longer duration, and sometimes stronger, in the southern channel, and the current of the ebb more feeble. In the southern channel, the ship should go about in the northward before Mengam tower-beacon touches the

left side of the old battery on Névent point, until above that rock, when the boards may be extended to 1 cable from the other shore.

In the northern channel go about in the southward before Mengam beacon touches Portzie point.

The following are the ranges on which a vessel should tack when heading for any portion of the shores of Brest roadstead: (For avoiding the shoals, see under the head of Dangers in the Rade de Brest, page 447.) Working-room
in the roads.

Between Portzie point and the Penfeld river, Mengam rock open of Portzie point.

Between Pointe des Espagnols and the extremity of Ile Longue, Portzie light open to the right of La Cormorandière, or Lanvéoc point open to the eastward of Ile Longue.

Between Ile Longue and Lanvéoc: Poulouen mill, (the northernmost of all on Kéleron peninsula,) open to the right of Ile Longue.

Between Ile Ronde and the entrance to the channel of Landerneau river, Lanvéoc fort open to the westward of Ile Ronde.

Between the channel of Landerneau river and the Penfeld, l'Armorique mill, (the second from the point,) open to the right of Corbeau fort.

It is impossible for a sailing-vessel to put to sea from Brest roads with very light winds, as the ebb-tide would set her on Névent or Petit Minou points. Sainte-Anne bay might be reached, and the anchor dropped temporarily. Leaving the
roads.

Working out against a westerly breeze, take the northern channel, keeping near Bertheaume bay rather than that of Camaret, so as to weather Toulinguet point shoals, or have the wind sufficiently free to take one of the passages between them. When abreast Les Pierres Noires, a stretch may be made to the Chaussée de Sein against the flood-tide. As a general rule, during the ebb-tide the longest boards are made on the port tack, and during the flood-tide on the starboard.

With a steady breeze from the westward, get under way in the roads two hours before high water, and the ship will be past Les Fillettes before the end of the ebb-tide.

Do not tack too close inshore in the Goulet, as there are Caution.

apt to be flaws in the wind, nor immediately to leeward of any rock.

Penfeld river. The mouth of the river Penfeld, forming the Port Militaire, is reserved for vessels of the French navy.* The depth in the river is 30 feet at low water, but it is very narrow, and tugs and hauling-lines are very generally used in moving large vessels. Ships are handled by the port officers, and lie in a single tier. The channel is marked on the starboard hand by red buoys, Nos. 2, 4, 6, 8, 10, and 12, which are in $4\frac{1}{2}$ fathoms water. On the port hand are black buoys, Nos. 1, 3, 5, and 7, near which are depths of 5, $4\frac{1}{2}$, $4\frac{1}{2}$, and 4 fathoms. Each buoy has painted on it its number and the depth of water. The direction of the channel is given by the signal-mast on with the second store-house. Entering and leaving the port are always done during the flood-tide.

La Rose rock. The only danger in the entrance to the port is La Rose rock, over which the depth at lowest equinoctial tides is 17 feet. It lies 87 yards SW. from Petit Château point, on the eastern side of the entrance.

Bar. The bar at the entrance has $3\frac{1}{4}$ -fathom depths at low water.

Storm-signals. Storm and weather signals are made from the entrance to man-of-war harbor.

City of Brest. The city of Brest, situated on the eastern shore of the Penfeld, and separated by that river from its suburb Recouvrance, is built upon the top and sloping sides of a hill in some places so steep that the ascent from the lower to the upper town is performed by flights of stairs.

A revolving bridge spans the river at a height of 88 feet above the level of low-water neaps, connecting Recouvrance with the heights of Brest. In addition, there are a floating bridge below the latter, one connecting the shores of the military port, and still another at the bottom of the harbor. The Bagnes or prisons for galley slaves are the largest in France; in 1873 they contained 3,000 convicts. The public institutions include a naval school, communal college, pub-

* Merchant-vessels cannot enter unless to load or unload government freight. The order to that effect has to be obtained from the *Directeur des mouvements du port*.

lic library, and botanic garden. There is a fine marine hospital also, with 26 rooms, each containing 53 beds.

The population of Brest has been decreasing for some years. In 1872 it was 66,272. Population.

The foreign commerce has declined considerably of late years, principally from lack of enterprise on the part of the larger capitalists. Commerce.

The principal foreign imports are coal, jute, cement, and bricks from England; timber, deals, and ice from Norway; hemp from Russia; tallow from the Rio de la Plata; wheat from Portugal, and timber from Prussia. The total value of English coal imported in 1873 was £31,000, of which 26 cargoes came in English bottoms, and 71 in French. Imports.

The exports comprise preserved sardines to the United States; telegraph-piles, oats, barley, vegetables, &c., to England; mixed cargoes of small value to other countries. Exports.

The coasting trade by sailing-vessels has decreased also in consequence of the facility offered by railways; in order to increase it steamers are now employed, more especially to and from Bordeaux. Coasting-trade.

In 1873, besides colonial produce, manufactured goods, wines, spirits, cider, dried fruits, &c., there were brought by coasters 21,000 tons of coal from the Auzin mines, in the Département du Nord, for the exclusive use of the government dock-yard. The exports by coasters include cereals, farm-produce, vegetables, preserved sardines, &c.

Besides several railways, a canal, leading from the Châteaulin river, joins Brest with Nantes.

The port-charges, &c., on a vessel measuring 300 tons, and carrying 450 tons of cargo, are, inward and outward : Port charges.

	Francs.	Centimes.
Pilotage, inward.....	144	70
Sanitary-dues.....	30	00
Clearance, inward.....	12	15
Quay-dues.....	150	00
Clearance, outward.....	2	10
Pilotage, outward.....	60	00
Brokerage.....	225	00
Total.....	623	95

Ship-masters speaking French may perform their own brokerage, and thus save 50 centimes a ton.

A vessel of 400 tons register, taking a pilot in and out,

could remain as long as desired, and sail again, for about \$30, provided she neither receive nor discharge any cargo.

**B a n k i n g -
houses.**

There is a branch of the Bank of France at Brest, and the Société Générale of Paris, a few years since, also opened an office there; independent of these establishments, the Comptoir du Finistère carries on its business as before. The rate of exchange on England varies considerably, ranging from 25 francs 20 centimes to 26 francs per pound sterling. At times there has been great difficulty in obtaining bills sterling; this is caused by a decrease in exports (principally of cattle and grain) to England.

Industries.

The manufactures of Brest are insignificant, the principal being that of glazed hats for seamen. Of the other industries, the fisheries sometimes give employment to 18,000 men, manning 4,000 boats of 19,000 tons aggregate measurement. As regards agriculture, little or no progress has been made, either in the cultivation of the soil, or in the implements used for the purpose. The peasantry are strongly opposed to innovations, and view with distrust the few made by the larger proprietors. The latter have another insurmountable evil to contend against, viz: the proverbial love of intoxicating spirits among the laborers, which is all the more noticeable from the contrast offered in the habits of the lower classes in other parts of the country.

**Repairs and as-
sistance.**

When repairs cannot be effected by the local shipwrights, the maritime authorities (after some formalities have been gone through to guard against interference with jealous local interests) promptly place at the disposal of merchant-ships, as well as men-of-war, the use of the government dock-yard; and they are ready at all times, at a fixed and moderate price, to send government steamers to the assistance of vessels in distress on the coast. The important services rendered in this respect cannot be too much lauded. In 1873, 39 ships of different nationalities put into the roads in distress, and were repaired.

Supplies.

As a coaling-station Brest affords great facilities; the price of English coal averages about 40 or 41 francs per ton, delivered on board. French coal from the Auzin mines can be obtained also, but for steaming purposes it is inferior to the English or Welsh. It is brought alongside in barges,

either in the roadstead or in the merchant or the military ports. Water is also brought off in water-boats, upon application to the “direction des mouvements du port.”

Galley-fires are not allowed to be lighted on board vessels moored above the bridge; those berthed below it can obtain permission to have them from the harbor-master.

Ships' boats land in the commercial port, and in the little basin at the angle of the château and a jetty, about 200 yards to the westward of the entrance to man-of-war harbor. Boat landings.

The Landerneau or Elorn river is navigable as far as the town of Landerneau, (9 miles from the mouth,) by vessels drawing 13 feet, during ordinary high tides. Its width up to the bridge at the latter town is between 400 and 550 yards; farther up the channel is much narrower. The bed of the river is quite level, and of mud throughout up to 450 yards below the town, where rocks are found. Landerneau river.

Landerneau is a small town of some 7,000 inhabitants, who maintain a coasting trade; a few deep-water ships also come there at times. The exports comprise grain and farm produce; the imports, coal, iron, steel, and salt. Vessels of 400 tons measurement have ascended to the town, loading and unloading, without grounding, at two-thirds mile below. Town.

Dues and charges on a vessel of 66 tons register, (114 tons burden,) drawing 10 feet: Expenses.

	Francs.	Centimes.
Pilotage from Brest.....	14	00
Entry.....	12	00
Health dues and pass.....	8	70
Brokerage, (50 cent. per ton burden).....	57	00
Ballast, (40 tons).....	46	00
Pilotage to Brest.....	14	00
Total.....	151	70

Labor, 3 francs per day; tracking, 1 franc each, but only come about 1 mile below the town. If a pilot be detained after the first day he is employed, his pay is 4 francs per day.

The bar of the river, which is 3 cables in extent east and west, is one-half mile outside of Sainte-Barbe point, and has 14 feet of water over it at lowest springs, so that 19 feet can be carried over it at ordinary low water. Above it the depths are 4½ to 7 fathoms for about 2 miles, or to one-half mile above Kerhuon bay. Below the bar the channel is straight, Bar.

narrow, and deep between Saint-Marc and Corbeau or Kéraliou banks. Depths of $5\frac{1}{2}$ fathoms are found up to SW. by S. of the Pointe du Moulin Blanc, which is 1 mile westward of that of Sainte-Barbe and separated from it by an inlet of the same name as the former. For two-thirds mile, south of Moulin Blanc point, there are only 10 feet at low water.

Dangers. The only dangers in the river are, a 4-foot patch, 330 yards SSE. of Sainte-Barbe point, and a small plateau near the northern bank, half a mile above Saint-Jean. The former is not buoyed; on the latter is a black tower which can be approached close-to in the southward. There is, also, an oyster-bed off the southern bank, below Saint-Jean, marked by two buoys and by poles.

Anchorage. The best anchorage in the river is off Kerhuon bay, about 300 yards from the southern bank, in 5 fathoms. Ships, bringing timber for the naval depot, come-to there, and it would berth much larger vessels. In Kerhuon bay are 2 mooring-buoys.

Tides. It is high water, full and change, at Landerneau, at 3^h 56^m. Ordinary springs rise $14\frac{3}{4}$ feet abreast the town, 16 feet at three-fourths of a mile below.

Pilots. The Brest pilots take vessels to Kerhuon inlet, where a river-pilot is found. Coming down, the latter take as far as Brest.

Directions. Vessels going up the river must have the wind between NW. and S., or be tracked. Sainte-Barbe point should be passed at about 100 yards distance, and the ship then kept in mid-channel to Kerhuon anchorage.

Rade de Châteaulin. The Rade de Châteaulin is 5 miles in extent to the eastward of the line joining Ile Ronde and Lanvéoc point, and 2 miles north and south. There are a number of small streams emptying into it, besides the Châteaulin river.

Working-room. The navigable space in this roadstead is greatly diminished by the numerous banks along its shores; it extends only about 3 miles to the eastward of Ile Ronde, Landévenec channel beginning there and running several miles to the mouth of Châteaulin river proper. Off Penarvir point the width is only 1 mile to the banks skirting the northern shore. The bottom, throughout, is sand and mud, at 6 to 14 fathoms. The only rocky patch is five-sixths of a mile

S. by W. from Doubidy point, on the range of Portzie light, midway between Ile Ronde and l'Armorique point. It is covered by 5 fathoms of water.

The northern shore of the Rade is clean to about 400 yards, between Ile Ronde and SW. of Doubidy point. To the eastward an extensive mud-bank carries the 5-fathom line to 1 mile distance.

The southern shore may be approached to about 2 cables between Lanvéoc and Penarvir points, a distance of 2 miles. For $1\frac{1}{2}$ miles eastward a ship may come to the range of Lanvéoc fort open of the rocks off Penarvir.

All the remainder of the bay is filled with soft, black mud-banks at slight depths, and even awash in some places. As there are no rocks, however, small craft can beat about over them at half-tide.

L'Anse de Lauberlac'h, a shallow bay 1 mile eastward of Ile Ronde, extends about the same distance to the north-northeastward. Anchorage is found in 13 feet water at 3 cables to the northward of Doubidy point, the eastern side of the entrance. During SW. winds and ebb-tide the sea is heavy, but the anchors hold well in the mud. Vessels bound for the Châteaulin river, and unprovided with a pilot, generally heave-to for one off the compass-buoys, (half a mile westward of Doubidy point.)

Pen-a-Land point is $1\frac{3}{4}$ miles east of Doubidy. The anchorage to the eastward of it is 4 miles E. $\frac{1}{2}$ S. from Ile Ronde, but the intervening bank extending five-sixths of a mile off shore, between the two points, prevents a straight course being followed for it. The general depths in the anchorage are only 2 and $2\frac{1}{2}$ fathoms, but in several places are holes where vessels of considerable draught could remain. On the bottom is a depth of very soft mud, of 3 feet.

Tinduff bay, which takes its name from the village on the second beach inside Pen-a-Land point, comprises all the space embraced between the latter point and that of Binde, to the southwestward of which are the islets of the same name. Three small streams empty into it, those of Saint-Claud, Loperhet, and Daoulas. On the latter is the small town of Daoulas, which can be reached by vessels drawing $11\frac{1}{2}$ feet. To the westward of the Pointe du Binde is a

Anse de Lau-
berlac'h.

Pen-a-Land an-
chorage.

Tinduff bay.

deepening of the water, 600 yards in width north and south, and extending from NW. of the Iles du Binde westward to the 8-fathom depths south of Pen-a-Land point.

Chenal de
Landévennec.

The circuitous channel leading to the mouth of the Châteaulin or Aulne river, beginning south of Pen-a-Land point, is named after the town of Landévennec, at the mouth of the river, built upon a high, wooded eminence, nearly surrounded on all sides by the winding stream. It is very deep except south of Logouna steeple, $1\frac{1}{2}$ miles to the eastward of Iles du Binde, where there is a bar with only 8 feet of water at lowest springs. The entire channel is marked by red and black buoys on the starboard and port hands respectively. Having entered the Rade de Châteaulin, Roscanvel mill (on Kélern peninsula) open to the northward of Ile Longue leads to the first buoy.

Le Faou.

Three small rivers flow into the Chenal de Landévennec from the eastward, those of l'Hôpital, Kéroulay, and Le Faou. On the latter is a town of the same name, of 1,200 inhabitants, situated on the railroad from Nantes to Brest.

Châteaulin
river.

Both banks of the Châteaulin river, near the mouth, are high and wooded, and present a very picturesque appearance. Abreast of Landévennec the channel is 7 to $8\frac{1}{2}$ fathoms deep; opposite it, a number of government vessels are moored along the shores of a little bight, called Penfourm anchorage.

Towns.

There are two towns on the Châteaulin, Port Launay and Châteaulin, situated respectively at 19 and 21 miles from Landévennec. The latter, which has a population of about 3,500, is at the head of the canal to Nantes.

CHAPTER XII.

SAINT-MATTHIEU POINT TO MELGORNE POINT, INCLUDING OUESSANT ISLAND.

Variation in 1876.—Ouessant island, $20^{\circ} 40'$ W.

The coast from Saint-Matthieu point runs 11 miles in a Coast. general direction of N. to Melgorne point, the NW. extreme of France. It is moderately high, and the breaks and fissures in its granite formation, and the numerous and remarkably-shaped rocks and islets near the land, render its features easy of recognition. The shore is generally steep-to, but so bordered by the numerous dangers that it should not be approached at night or in thick weather within a depth of 45 fathoms, where the bottom will be found of gray sand mixed with flints and other stones.

The Basse du Chenal, with 5 to 8 feet on it, marked by a Basse du Chenal. red buoy on the eastern side, and steep close-to, is the SW. danger of the Chenal du Four. It lies $1\frac{1}{2}$ miles SW. by W. $\frac{3}{4}$ W. from Saint-Matthieu light, with Kermorvan point in line with Portzmoguer beach, N. by E. $\frac{1}{2}$ E.

To the northward of Saint-Matthieu point the coast is Kermorvan point. foul for one-half to three-fourths mile out. Kermorvan point, a little over 2 miles in the NNW., is the western extreme of a peninsula rather lower than the land to the southward, and projecting from just to the northward of the port of Le Conquet. There are two redoubts on it besides the light-tower.

At two thirds mile S. $\frac{1}{2}$ W. from Kermorvan point, and Basse des Renards. one-half mile off Les Renards point, which is distinguished by a semaphore, is the Basse des Renards, with 8 feet on it, marked by a black buoy off the western edge. At 2 cables inshore of it are Les Renards rocks, marked by a black tower surmounted by a staff and ball.

Shoal patches also extend to the westward, covered by 3 Grande Vinière. and $3\frac{1}{2}$ fathoms. Outside them a rock, called La Grande

Vinotière, three-fourths mile WNW. from the light, is marked by a black and red tower-beacon. Off the N. point of the peninsula is an islet beyond which the water is shoal for one-fourth mile.

Le Conquet.

The port of Le Conquet, extending in $1\frac{1}{2}$ miles to the eastward, is very narrow, and dries at low water. The place has 1,100 inhabitants, but is of no importance commercially. The white steeple on the southern side of the entrance is a good landmark. Rocky ledges extend from both sides of the entrance.

Le Conquet
light: Lat. 48°
 $21' 44''$ N.; long.
 $4^{\circ} 47' 31''$ W.

Le Conquet light is *fixed white*, dioptric, of the third order, visible 11 miles, exhibited at an elevation of 72 feet above the sea, from a square white tower, 59 feet high, standing on Kermorvan point, near the water's edge. It is proposed to establish a fog-signal on the point.

Life-saving
station.

A life-boat is stationed at Le Conquet, and connected with it is a rocket-apparatus.

Anse des
Blancs Sablons.

To the northeastward of Kermorvan point, in l'Anse des Blancs Sablons, is good anchorage in 6 to 9 fathoms, over sand and gravel, at one-half mile from the point. This bay is two-thirds mile deep, and 1 mile in width NNE. to a sandy creek, called Portz-Ilien, where very good water is found and can be brought off in boats.

Corsen point.

At $2\frac{3}{4}$ miles northward of Kermorvan point is that of Corsen, easily distinguished by its steep cliffs and semaphore; it is often the first land made coming from Ouessant. About five-sixths of a mile to the southeastward of it is the small bay of Portzmoguer, from the southern point of which projects a ridge of rocks terminating in the Basse Jaune, 550 yards off shore.

Laberildut.

From Corsen point, which cannot be approached to nearer than one-third of a mile, the coast, becoming more and more foul, runs $3\frac{1}{2}$ miles NNE. to the little port of Laberildut, which extends in about three-fourths of a mile and dries at low water, and the entrance to which is so studded with shoals that it is impossible to enter without a pilot. There are two villages on this arm of the sea—Laber and Lanildut—and about 1 mile inland is the town of Brélès, the steeple of which can be seen from the offing in clear weather. There is a moderate exportation of granite carried on. A small steam-tug can be had for towing vessels out, at a cost

of 3 francs. Pilotage is 1 franc per foot draught. The only port due is 2 francs paid to the customs.

Rocks extend far out from this last stretch of coast, with channels inshore of them, taken by coasters to avoid the swift currents farther out. Le Goaltock, five-sixths of a mile N. by W. from Corsen point, is 175 yards in extent, and steep-to except in the SE., where a plateau runs out 1 cable's length. The Plateau des Fourches, beginning at half a mile north of Goaltock, extends 1 mile to the north-north-westward; on the southern portion are two rocks that are always visible. Men-Portz Guen is a half-tide rock lying NE. of Les Fourches, 4 cables off shore. To the northward are the Basse Olivier, half a mile from Men-Portz-Guen, and Pierre Laber, 1 mile W. by S. from the entrance to Laberildut inlet. On the former are two rocks that uncover 1 and 2 feet respectively.

There are, in addition, a multitude of shoal patches extending as far as 2 miles out; the farthest is La Valbelle, marked by a bell-buoy,* on the range of Plouarzel steeple seen between Les Fourches. Le Tendoc rock, with only 9 feet over it, marked on its western side by a black buoy, lies about 1 mile westward of Goaltock, on the range of the latter and the ruined mill of Trézien.

From Laberildut port the coast runs to the north-north-westward, to the southern point of Portzpoder bay, which is recognizable by an eminence crowned by a semaphore. Midway, among the numerous rocks that forbid a nearer approach than two-thirds of a mile, is Mélon island, about 550 yards long, north and south. Coasters frequently run inshore of it from the northward, and ground, leaving with cargoes of stone. The town of the same name on the shore opposite, consists of a number of scattered houses, mostly white, with slate roofs.

The name of Les Linious is given to a cluster of rocky heads about 1 mile in extent NE. and SW., lying 1 mile off shore, WNW. of Mélon island. Le Grand Liniou, in the middle of the group, always shows above water. In foggy

*A recent notice from the French Hydrographic Office announces that this buoy no longer exists; no information has been received as to whether it will be replaced or not.

weather, the small craft bound for Laber, Mélon, or Argenton try to make them, being well off shore and marked by constant breakers. Running north and south outside them, the Basse Saint-Jacques, covered by 4 fathoms, one-third of a mile to the westward of the southern extremity, should be avoided by vessels of large or of moderate draught.

Basse Meur.

The Basse Meur is a rocky patch, with 2 heads, reported to be covered by very little water, lying 2 miles west of Les Linious, on the range of Landunévès mill and Petit Melgorne rock, and with Saint-Matthieu light-tower between the tower on Kermorvan point and the summit of that peninsula.

Portzpoder bay.

Portzpoder bay is open to the westward, and bordered by a beach 550 yards in length running north and south. It is almost unapproachable from the number of dangers immediately to the westward. In case of being drawn inshore, it is recommended to try to make the northern part of the beach, but it would be almost impossible to do so without considerable local knowledge.

Melgorne point.

Portzpoder bay terminates in the north in Saint-Laurent peninsula, the western extreme of which is Pointe Melgorne. Of the rocks extending half a mile to the westward, the outermost, Petit Melgorne, never covers.

Le Four light:
Lat. $48^{\circ} 31' 23''$
N.; long. $4^{\circ} 43' 22''$ W.

At $1\frac{1}{6}$ miles WNW. of Melgorne point is the large, dark, conical rock of Le Four, larger at the top than at the bottom, with shoal patches on all sides. On it stands a circular stone tower, 82 feet high, the base of which covers the entire rock. The light exhibited from it, elevated 92 feet above sea-level, visible 17 miles, is *white, fixed* for 30 seconds, with 8 *flushes* during the following 30 seconds. The illuminating apparatus is dioptric, of the third order.

Fog-trumpet.

In thick weather a steam fog-trumpet is sounded for 5 seconds, at intervals of 20 seconds.

Port of Argenton.

The port of Argenton is a small inlet, drying at low water, east of the small peninsula (often called island) of Dolvès, which is one-fourth of a mile NE. of that of Saint-Laurent.

Ile d'Iock.

At half a mile NW. of the entrance to Argenton bay is l'Ile d'Iock, 2 cables in extent north and south, connected with the main-land at low water.

Shoals.

The approaches to this NW. extreme of France are studded with shoals, too numerous for detail description. No

ship-master, without good local knowledge, should pass to the eastward of the meridian of Le Four or Les Linious. The Basse Boureau, 1 mile W. $\frac{1}{2}$ S. from Le Four, is covered by $5\frac{1}{2}$ fathoms. It is on the range of Saint-Matthieu light tower open $0^{\circ} 17'$ to the right of Corsen point. At half a mile ENE. from Le Four is Grand Château rock, on the southern edge of a plateau two-thirds of a mile in extent. Among other rocks of this group, that never cover, is Men Hir, 500 yards NW. of the latter.

To the northeastward of this plateau are Les Chambres, a number of large rocks that always show above water.

In this vicinity the current of the flood sets NE.; that of the ebb SW. The latter is felt at Le Four 2 hours before the time of high water at Brest, and the former $1\frac{1}{2}$ hours after low water at Brest.

Tidal currents.

Les Plâtresses are a cluster of rocks three-fourths of a mile in extent north and south, some of which uncover at half-ebb, lying SW. from La Valbelle, about 4 cables outside the alignment of Saint-Matthieu and Le Conquet lights. Two red buoys mark them, off the NE. and SE. corners, respectively; between the former and that of Valbelle is a channel a little over half a mile wide. The group is on the west side of Le Four channel, (see end of chapter,) and on the east side of La Helle channel.

Les Plâtresses.

About $1\frac{1}{2}$ miles NW. from Les Plâtresses, on the range of La Helle rock open one-half degree to the left of Molène island, is the Basse Saint-Louis, covered by $2\frac{1}{2}$ fathoms water; and five-sixths of a mile W. by N. from the latter, with Ploumoguier steeple touching the north side of Goaltock rock, is Saint-Charles shoal with 6 fathoms over it.

Shoals.

The extreme eastern limit of the plateaux between Ouesant and the main, runs north and south, and is $3\frac{3}{4}$ miles long in a nearly straight line between the Basse Orientale du Courleau and the Bossemen Oriental, passing a short half-mile west of La Grande Vinotière. The former, covered by 6 feet water, is 1 mile NNW. of La Grande Vinotière beacon, on the range of Ploumoguier steeple (high and pointed) over Brenterc'h guard-house, ENE. There is a $2\frac{3}{4}$ -fathom patch one-half mile north of it.

Basse Orientale
du Courleau.

The islet called Le Bossemen Oriental, the easternmost of the Chaussée des Pierres Noires, is small, circular, 15

Les Bossemen.

feet above high-water mark. It is $2\frac{1}{6}$ miles WSW. from Saint-Matthieu point, and it and the Bossemen Occidental, one-half mile westward, and showing 20 feet, are the only rocks that remain uncovered between that point and Les Cheminées. A little less than one-half mile to the southward on the range of the eastern Bossemen a little open of Corsen point, is the Basse Royale, covered by 4 fathoms. This shoal is just outside the range of visibility of Capucins light. Men Civien rock, which uncovers 13 feet in springs, is 2 cables N. by E. of the eastern Bossemen. The Basse des Bossemen is a small sunken rock, with about 10 feet water on it, and lies with the western Bossemen nearly in line with the SE. point of Béniguet island, and the eastern Bossemen NE., one-third of a mile distant, open a little to the right of Le Conquet steeple.

Chaussée des
Pierres Noires.

The Chaussée des Pierres Noires extends $5\frac{1}{2}$ miles to the westward of Basse Royale, terminating in the Basse Occidentale, which is covered by 2 fathoms water, and the ranges of which are: Les Cheminées seen midway between Pierres Noires light-tower and Le Diamant rock; the eastern head of the Serroux seen to the left of the western point of Triélen island.

Pierres Noires.

Les Pierres Noires, the westernmost rocks of the Chaussée that uncover, are about 15 feet above high-water level, with ledges extending 1 cable from them. The southwesternmost of this outer group is Le Diamant, which is bold all round, with deep water between it and the other rocks; but at 1 cable SSW. of it is Le Roux, a patch that uncovers 2 feet at low water.

Pierres Noires
light: Lat. 48°
 $18' 40''$ N.; long.
 $4^{\circ} 54' 53''$ W.

On the largest of Les Pierres Noires stands a circular stone tower 82 feet high, exhibiting, at an elevation of 90 feet above the sea, a *red* light *flashing* every 10 *seconds*, visible 12 miles. The illuminating apparatus is dioptric, of the third order.

Les Cheminées.

Of the rocks near the southern edge of the Chaussée, Les Cheminées are three in number, showing about 30 feet above high water, lying $1\frac{1}{3}$ miles E. by S. from Pierres Noires light. The easternmost two are nearly joined. There are a few half-tide rocks, on which the sea always breaks, on the eastern side. The western Cheminée is bold and lies on the SE. side of one of the passages into the new channel into Le Four.

Le Ranvel is a ledge of rocks 5 or 6 feet above high-water springs. In the west and southwest are two patches which uncover 4 and 9 feet respectively. These rocks are the southernmost of the Chaussée. Le Ranvel.

The Basse Large is a bank about three-fourths of a mile in length NNE. and SSW., and one-half mile in breadth. On its northern part there are only 2 feet at low water, and on its SE. side one spot dries; on other parts of the bank there are 2 to 4 fathoms water. The SE. shoal spot lies with Le Diamant in line with Les Cheminées, and Lochrist church bearing NE. $\frac{3}{4}$ E., well open to the right of the eastern Bossemen. Vessels standing toward the bank should keep Le Diamant open to the southward of Le Ranvel. Basse Large.

Kérouroc, $1\frac{1}{2}$ miles SSW. from Béniguet island, is a small islet where a boat may find landing in almost any weather. There are many half-tide rocks and shallow patches round it, and about $1\frac{1}{2}$ cables north of it the Pierre des Poissons rises 27 feet above low-water springs. Kérouroc.
Pierre des Poissons.

The Placen-ar-Béniguet is a large ledge of rocks a long half-mile north of Les Pierres Noires. These rocks uncover 18 feet at springs, and being at all times seen by the breakers are a good mark to avoid other dangers. Midway between them and Les Pierres Noires is a depth of 6 fathoms. Placen-Ar-Béniguet.

Le Boufoulloc is a large, uneven, rocky bank, on which there are two small heads. The southern one lies a short mile to the west-northwestward of Le Diamant, with Saint-Matthieu light barely open to the northward of Kérouroc islet. The northern head is 1 mile from Le Diamant, with Lochrist steeple just clear north of Placen-ar-Béniguet. Between the latter and Boufoulloc is a bank about one-half mile in length ESE. and WNW., with $1\frac{3}{4}$ to $3\frac{1}{2}$ fathoms water on it. Le Boufoulloc.

La Siège comprises a group of rocks, two of which never cover and are surrounded by others that dry only at low-water springs. They lie midway between Les Pierres Noires and Kérouroc, a little to the northwestward of the line. La Siège.

The passage between La Siège and Kérouroc has a depth of $2\frac{1}{2}$ fathoms. The range leading through is Le Cromic, seen one third way from the former to the latter. La Siège passage.

Petit Taur. au. Petit Taureau is a rocky shoal, which uncovers 9 feet at springs. It lies with Le Conquet church on with the SE. end of Béniguet island and Le Ranvel rock seen between Les Cheminées and La Siège. The depths all round are $4\frac{1}{2}$ to 5 fathoms.

Béniguet isl- and. Béniguet is a low island $1\frac{1}{2}$ miles long NE. and SW. with a width of about 400 yards. The NE. point is $2\frac{1}{6}$ miles W. by S. from Le Conquet light. A landing is easily effected on a sandy beach on the SE. shore. There is a soda factory on the island, and grain is raised. The only water on the island is brackish. A large number of rocks and sunken ledges lie on the SE. side, most of which begin to uncover at one-third ebb, and show a great extent of surface at low water. A long ledge extends from the SW. point; as the sea breaks on them with the least swell, they are easily avoided. At the extremity are the Loudégues, two small rocks a few feet above the surface at all times, and recognizable by their proximity to Fornic, a large rock, 18 feet out of water, 500 yards W. by S. of them. There are also two other small detached pieces of high rock, surrounded with low-tide ledges, on the northern and western side of the island about 1 cable off; and a broken ledge of rocks runs from the north extreme, the whole of which is uncovered at low water. Off the beach on the northern side is anchorage for small vessels close to it. The island is surrounded on all sides by a beach of pebbles well calculated for ballast.

Currents. Eastward of Béniguet island the tidal currents run strong, NE. during the flood and SW. during the ebb.

Rocky bottom is found at $2\frac{1}{2}$ to 4 fathoms for 1 mile eastward. Shoals extend 2 miles to the northward to the Chenal du Four.

Les Belveignou. Les Belveignou are a large group of black looking ledges of considerable extent at low water, with two small spots only appearing at the surface at high-water neaps; the remainder uncover gradually with the ebb, and at low water they mark the eastern boundary of the new channel into Le Four.

New channel into the Chenal du Four. There is a channel between Béniguet island in the east and those of Quéménès, Lytiry, and Morgol in the west, with depths of $10\frac{1}{2}$ feet at low-water springs, which gives 18 feet at low-water neaps, $23\frac{1}{2}$ feet at half-tide, and 29 at high-

water neaps.* A vessel, therefore, set in by the swell or making the vicinity during a fog with SW. winds could very frequently use it. The tides run through with great rapidity, and every precaution must be taken to insure the vessel's answering the helm promptly.

Steer for Triélen island about N. by E., keeping the eastern Serroux, which is always visible, well open to the left of it, to clear the Basse Occidentale des Pierres Noires. When Saint-Matthieu light-tower opens a little to the northward of Placen-ar-Béniguet, which is always seen either as rocks or breakers, steer for Morgol islet until Lochrist church is just over the S. end of Béniguet. Then steer for the NW. end of the latter, (about ENE.,) taking care on nearing the Loudéguet rocks not to shut in the two eastern Cheminées with Kérouroc until the spire of Lochrist is seen over the centre of Béniguet. Starboard the helm in time to steer away to the northward, with Pierre des Poissons, Kérouroc, and Les Cheminées rocks in line astern. This leads in mid-channel between Morgol isle and Belveignou rock. Be careful not to open the eastern Loudéguet from the W. end of Kérouroc until Le Cromic comes on with Morgol, when the western extremity of Belveignou ledge will have been passed, and the channel will begin to widen and deepen. Having passed the latter, haul to the northeastward, steering with Le Cromic open to the westward of Morgol; this range astern leads into Le Four channel, leaving Petit Pourceaux, and various other ledges, rocks, and shoals forming Les Pourceaux bank, on the port side; and Petit Courleau, which dries 15 feet at low water, and other dangers, on the starboard side.

The three islands of Lytiry, Quéménès, and Lédénès de Quéménès form, with Morgol islet, a group crowning a plateau $1\frac{1}{2}$ miles in extent E. and W., and 1 mile N. and S. The first, the smallest of the three, about 650 yards

Lytiry island.

* Captain Hurd, R. N., passing through there in 1806, says: "In every part of the channel to within one-half mile of Béniguet, there are from 10 to 6 fathoms water, and in the shoalest part, between Morgol isle and Belveignou, I have nowhere found less than $3\frac{1}{2}$ fathoms at the lowest springs; and therefore on all neap tides you may fairly calculate on 4 fathoms at low water." The depths quoted above are given by Captain Thomassin, of the French Navy, in 1871.

long, is uncultivated; sea-weed is collected, besides shells and shrimps. Landing is effected on the SE. side. Between it and the other islands is a passage 60 yards wide, running N. by W., with only 5 feet at low water.

Quéménès isl
and.

Quéménès island is about 1,500 yards long E. and W., and 300 to 400 yards broad; it is connected with Lédénès by rocky ledges 300 yards long, which dry at low water. There are pasture-lands on the island, and horses, cattle, sheep, and hogs are raised. There are several houses on the island. Landing is effected on the SE. side; boats of 20 tons come there to load soda.

Lédénès de
Quéménès.

Lédénès de Quéménès is about 550 yards long, N. of the E. end of Quéménès.

Rocks and shoals extend a short mile northward of this islet. The N. point of the Chaussée des Pourceaux is 2 miles, NE. by E. $\frac{1}{4}$ E., from it, with Lochrist church just open to the southward of the light-tower on Kermorvan point.

Morgol islet.

Morgol islet has the appearance of a pebble-beach, surrounded by black ledges in all directions. The latter run to the SW. and join those of Le Cromic; from its eastern side they extend one-fourth mile, forming the western boundary of the new channel into Le Four.

Le Cromic.

Le Cromic, S. of Lytiry and W. of Morgol, is a remarkable, small, high rock, about 30 feet above high water, and at a distance of a few miles in hazy weather it has much the appearance of a small vessel under sail. There are many half-tide and low-water ledges running from it to the southward, the outermost of which, a long half-mile off, begins to uncover at half-ebb. The mark for the eastern point of this ledge is the eastern Cheminée open slightly to the westward of the Kérouroc, and for the S. point, Lochrist church spire within the N. point of Béniguet.

Passage be-
tween Quéménès
and Triélen.

Between Quéménès and Triélen islands is a passage, with $11\frac{4}{5}$ feet at low-water springs. It is about 2 cables in width, and runs N. and S. The length between the islands and between adjacent shoals in the northward is 2 miles, and vessels may stand on $2\frac{1}{2}$ miles farther to clear the Plateau de la Helle, or pass out to the eastward S. of the latter. A vessel becalmed in the southward and set in by the flood-tide, could drop through, dragging a weight on the end of

her chain instead of the anchor, because of the rocky bottom.

To navigate this channel, steer N. or S., as the case may be, from the range of Saint-Matthieu light on with the S. end of Béniguet, to one-half mile N. of La Helle rock, passing one-third way from Triélen to Quéménès. To pass out S. of the Plateau de la Helle, bring a mill on Molène island on with a white beacon on Lédénès de Molène, astern, and steer away E. $\frac{1}{2}$ N. This latter pass is called the Chenal du Las. Directions.

About one-half mile to the southward of the entrance to the channel, between Quéménès and Triélen, is the Vieille Noire, (Groac'hdu,) a rocky patch about $1\frac{1}{2}$ cables in extent, uncovering 13 feet at low-water springs. Heading up for the passage, it is passed to starboard. It lies with the church of Le Conquet open of the northern end of Béniguet, about E. $\frac{1}{4}$ N., and the eastern Bossemen a little open of the ledge of rocks or outermost breaker running from that island, about SE. by E. $\frac{1}{4}$ E. Vieille Noire.

At 6 cables SW. by W. from Vieille Noire is a small rock unnamed, which uncovers 10 feet at low-water springs, with $3\frac{1}{4}$ to $3\frac{3}{4}$ fathoms round it. The marks for it are Saint-Matthieu light-house nearly in line with the Loudéguet rocks, bearing about E. by S., and Molène semaphore a little within the W. end of Triélen island, NNW.

La Helle plateau, comprising a number of rocks and shoals, is the northeastern group of the dangers between Ouessant and the main. It is $2\frac{1}{3}$ miles in length, commencing at $1\frac{3}{4}$ miles N. of Quéménès, with a breadth of $1\frac{1}{2}$ miles E. and W. The most prominent rock is La Helle, which never covers, and lies near the western edge, five-sixths mile from the northern extremity of the plateau. It presents somewhat the appearance of a vessel under sail. Plateau de la Helle.

The bank is separated from Les Plâtresses by the Chenal de la Helle. (See end of chapter.)

Triélen is a low island, 1,100 yards long NE. and SW., and quite narrow. It is connected by a plateau that dries at low water, with Molène island, $1\frac{1}{3}$ miles NW. by N. Grain is raised in small quantities. It has a salt-water pond on its E. end, surrounded by a stony beach. NNW. $2\frac{1}{2}$ cables from the eastern end, is the Ile aux Chrétiens, a Triélen island.

- small beach-looking islet, with black ledges running from it, at low water, in every direction. A long half mile, S. by W., from the western end is a large bed of rocks, called Les Serroux, visible at all times of tide, except very high springs, and of considerable extent at low water.
- Les Serroux.
- Cleu Basseven. Cleu Basseven is a bank about half a mile in length ENE. and WSW., and one-fourth of a mile in breadth. A spot in the middle of it uncovers 3 feet at low-water springs, but elsewhere there are from 1 to $5\frac{3}{4}$ fathoms water. The eastern Serroux, just open westward of Triélen island, leads eastward of the bank.
- Molène island. Molène is the largest and most important of the islands of this archipelago; it is about half a mile in diameter, and is connected by a stony isthmus, which dries 12 feet at low water, with an islet, called the Lédénès de Molène, one fourth of a mile to the northeastward. It is inhabited by about 550 people engaged in fishing, raising grain, and gathering seaweed. The houses are scattered about the island, and there are also a church, a semaphore, and a couple of mills. The port, which dries at low water, is on the NE. coast, between this island and the Lédénès de Molène, which is 2 cables in extent, and which has a white beacon in the southern part. There is anchorage in 3 and $3\frac{1}{2}$ fathoms, over sand, at one-quarter mile north of the island, but the channel to it is tortuous and narrow, and only 11 feet deep at low water.
- Life-boat. A life-boat is stationed on Molène island.
- Balanec island. Balanec islet, $1\frac{1}{6}$ miles NNW. from Molène, is half a mile in extent NNE. and SSW.; there are a couple of houses and some pasture-lands on it. Landing is effected on the SE. side, between it and a couple of rocks close to.
- Bannec island. Bannec islet, half a mile long north and south, lying $1\frac{1}{6}$ miles NW. by W. from Balanec, and 2 miles SSE. $\frac{1}{2}$ E. from the eastern point of Ouessant island, is uninhabited. It is quite low, the highest part being near the south end, and is surrounded by rocks showing at all times, extending half a mile to the south-southwestward, and half a mile to the N. by W. Men Tensel rock, which uncovers 13 feet, is one-third of a mile west of the northernmost of the latter, and is the eastern boundary of the Fromveur passage.
- Pierres Vertes. At $2\frac{2}{3}$ miles SSW. of Bannec islet are the Pierres Vertes which rise from a bank five-sixths of a mile in length NE.

and SW., and uncover 7 feet at low water. At one-third of a mile NE. from them, on the same bank, is Gondichoe, which also dries 7 feet. The Basse Occidentale des Pierres Vertes, in the SW. corner of the plateau, is covered by $4\frac{1}{2}$ fathoms water.

These shoals, and others between them and Bannec, form the SE. boundary of the Fromveur channel.

Should a vessel of moderate draught be drifted by the currents to the eastward of the Pierres Vertes, a signal would soon bring a pilot from Molène, who would take her through some one of the passes among the islands and rocks. Pilots.

Ouessant, or Ushant island, 11 miles off the coast of France, between Saint-Matthieu and Melgorne points, is of irregular shape, $4\frac{1}{2}$ miles long ENE. and WSW., with a width of about 2 miles. It is tolerably fertile, affording pasture to a good many sheep and horses. In some places it is nearly 200 feet high, and can be seen in good weather from a distance of 15 to 20 miles, presenting an irregular profile. It is composed in great part of huge, rough masses of granite. The inhabitants, numbering about 2,500, are mostly shepherds and fishermen, many of the latter being quite competent to pilot vessels about among the islands and shoals to the eastward. Ouessant isl.
and.

A great many vessels pass in sight daily, taking a new departure for the Mediterranean, the equator, or the West Indies; in view of this fact telegraphic communication has been established with the main-land, and captains, by signaling to either one of the two semaphores, (one near each light,) can send messages to any part of the world.

The coasts of the island are very foul, the northern being the least dangerous in that respect. There are but few anchorages and those are poor. For these reasons, and, also, because the island is often concealed in fogs, and soundings are of little avail in determining a ship's bearing and distance from it, and the tidal currents run with great velocity during spring-tides, it is a source of great uneasiness to mariners cruising in the vicinity. It is recommended not to approach it nearer than 2 or 3 miles, especially in calm weather, because of the currents.

Créac'h light: On Créac'h point, on the NW. coast, stands a circular stone tower, 152 feet high, painted in horizontal black and white bands, from which is exhibited, at an elevation of 223 feet above the sea, a *revolving* light, showing, at intervals of 20 seconds, 2 white flashes and 1 red flash in succession. The illuminating apparatus is dioptric, of the first order, and the light is visible 24 miles.

Life-boat. A life-boat is stationed on the point, and there is a semaphore just to the southward of the light, with the geographical number B. G. N. T.

Fog-signal. On Corn-Pern point, the western extreme of the island, two-thirds of a mile SSW. from Créac'h light, is a compressed-air trumpet, which, in foggy weather, is sounded for 2 seconds at intervals of 10 seconds. The blasts may be heard 3 miles under favorable circumstances.

Lourvas shoal. From the latter point shoals project two-thirds of a mile to the westward and to the southwestward, the farthest in the latter direction being the Leurvas, two heads of which dry 4 and 18 feet respectively. The Corn-Pern rocks, near the point, are always visible.

Lampaul bay. Lampaul bay, on the southwest coast, extends in $1\frac{1}{4}$ miles, with a width averaging about three-fifths of a mile. Rocks project out $1\frac{1}{2}$ miles in the prolongation of the southern, and two-thirds of a mile in the prolongation of the northern, shore. The depth of water is good, over sand bottom, but vessels anchored there are exposed to the fury of the SW. gales, which are the most frequent. In the middle of the bay is an enormous rock, called Le Corce, which may be passed either to starboard or to port. To enter, steer for Le Stiff light-tower slightly open to the left of Le Corce, and come to ESE. of the latter, in 7 to 12 fathoms water, or ENE. of it in 8 fathoms.

Large vessels often anchor NW. of Le Corce, but small craft and coasters frequently come to SW. of Men-ar-Blanc tower, (at the head of the bay,) 2 cables off shore. A chain lies across the bottom, outside the mole, to catch the anchors in case of dragging.

To avoid the Leurvas rocks and a patch covered by 3 fathoms a short distance inshore of them, keep Lampaul church (the northwestern of two seen at the head of the bay) open of the most prominent point of the northern

shore of the bay ; to clear Basse Bridy, in the prolongation of the southern shore of the bay, $1\frac{1}{2}$ miles off, keep Saint-Nicolas chapel (on a beach and to the right of Lampaul) a little open to the right of Le Piligent, a rock which never covers, lying $2\frac{1}{2}$ cables NW. from the extremity of the southern shore.

The tidal currents are not particularly rapid in the bay, but it has been found impossible to beat out against a SW. wind and flood-tide.

A guard-vessel of Brest is generally anchored, in readiness to give assistance, in 8 fathoms, between the south coast and Le Truc rock, which is on the point of a plateau extending along the north shore, from the head of the bay to about 3 cables from Le Corce. Guard-boat.

La Jument (Ar Gazek) rock, $1\frac{1}{4}$ miles SSW. from the extremity of the southern shore of Lampaul bay, dries 19 feet in spring tides, and is therefore almost always visible. It is the southernmost danger immediately off Ouessant, and is cleared in the SE. by keeping the large rock of Enès Nein touching the NE. point of the island. La Jument.

The SE. coast of Ouessant runs NE. and SW. $3\frac{1}{2}$ miles and is bordered by rocks to a distance of one-half mile. A long mile from the southern point is the bay of Pen-ar-roc'h, where large vessels can come and anchor in 6 fathoms water over sand, at 1 cable eastward from Pen-ar-roc'h point, recognizable by a mill a short distance to the northward. South of the point are a cluster of rocks, called Les Dibrayers, that are almost always visible. The outermost of these is Men Cren, 4 cables off shore, due south from the mill ; it only covers in the highest springs. Pen - ar - Roc'h anchorage.

To reach the anchorage, the only one of any avail to vessels drawn into the Fromveur passage, pass 300 yards south of Men Cren, and close to the eastward of it, steering north to pass also close to the eastward of Roc'h Mélen and Roc'h Neil, two rocks 100 yards off shore which never cover, and anchor $1\frac{1}{2}$ cables off shore, SE. by E. from the mill.

Should the current set the vessel to the eastward, there is anchorage 1 mile to the east-northeastward of that of Pen-ar-Roc'h, 1 cable from the shore in 8 to $9\frac{1}{2}$ fathoms water, in front of Portz-Guen, a small inlet that serves as a rendezvous for fishing-boats. There is a rock awash at low water Portz-Guen.

6 cables ENE. from the mill, which is avoided by keeping La Jument on with Roc'h Mélen until the little beach to the right of the mill bears NW. by N. There are pilots here ready to come on board on the hoisting of the signal, whatever be the state of the weather.

Port de Dar-
land.

On the SE. shore of Ouessant, 1 mile from the eastern point, is the little inlet of Darland; rocks extend one-half mile out, but between them is a channel 2 cables wide, with depths of 8 to 11 fathoms over sand.

Basse du From-
veur.

The outermost shoal east of the eastern extreme of Ouessant is the Basse du Fromveur, lying three-fourths of a mile off, and covered by 8 fathoms.

Le Stiff light:
Lat. $48^{\circ} 28' 31''$
N.; long. $5^{\circ} 03' 32''$ W.

On the NE. point of the island stand two white round towers united, 85 feet high, exhibiting, at an elevation of 272 feet above sea-level, a *fixed white*, dioptric, first-order light, visible 18 miles.

Semaphore.

A little to the southward of the towers is a semaphore, the geographical number of which is B. G. N. T.

Baie du Stiff.

SE. of this light is Le Stiff bay, two-thirds mile wide at the entrance, and extending in to the southwestward as much as one-half mile in some places. The anchoring ground is SE., 1 mile from the light, in 8 to 10 fathoms water, sandy bottom. To enter it, pass at least one-third mile NW. of Men Corn rock, (one-half mile off the east point of the island, and marked by a black tower;) Gorlébian, near the middle of the entrance, and marked by a red tower, should be passed $1\frac{1}{2}$ cables to starboard. Come to about 400 yards to the southward of it. There is a mooring-buoy in the bay. No one is recommended to remain there, because if caught by a gale of wind from NE., east, or SE., there would be but little chance of saving the vessel or crew.

Béninou bay.

Béninou bay is on the north shore of the island, between the northern point and Keller island. It is half a mile wide and two-thirds of a mile deep. The bottom is rock, at 11 fathoms, and it is open to the N. and NE. The entrance is not difficult, but the two currents of the ebb, setting respectively S. and SW. round Keller island, must be guarded against. Getting under way, with NE. or N. winds, advantage must be taken of the early flood to weather Keller island, as at half-tide a counter-current sets right into the bay.

After landing in the bay, the top of the cliff is reached by an iron ladder hung there.

Off the north point of the island are several rocks, of which Le Crom, the outermost, is noticeable from having three pinnacles; Roc'h Mel, inshore of it, and much larger, may also be distinguished, being visible at all times, with two pinnacles.

Keller island, half a mile westward of the north point of Ouessant, is half a mile long, east and west, and affords a partial lee to vessels anchored in Béninou bay. To the westward of it, the Chaussée of the same name, commonly called Florus by fishermen and others, extends $1\frac{1}{3}$ miles W. $\frac{1}{2}$ N. The rocks remain awash, at low water, for 1 mile out; the westernmost, Basse Callet, covered by 11 fathoms water, is on the ranges of Le Stiff light-tower on with the top of Keller island, and Corn-Pern rocks touching the west extreme of Ouessant. Vessels passing to the northward or southward should keep well to the westward of the latter range; 4 miles is recommended as the limit of approach during spring-tides.

There is excellent fishing among the rocks of the Chaussée. The name of Raz du Florus is given to the rapids on the Chaussée de Keller, which are extremely dangerous during spring-tides, especially with the wind against the current. The Raz extends from the Corn-Pern rocks to the Basse Meur, which is just inside Basse Callet, and covered by $10\frac{1}{2}$ feet water. The rapids run most swiftly at half-tide, the worst being off the western point of the island, between Corn-Pern rocks and Créac'h light. The inhabitants aver that the current is stronger than in the Fromveur passage.

The Haut-Fond d'Ouessant is a bank $1\frac{2}{3}$ miles in extent, N. by W. and S. by E., with a width of half a mile in the middle. It is covered by 25 to 33 fathoms, broken-shell bottom, while all round it the depths are 43 to 50 fathoms. The northern extremity is $3\frac{1}{6}$ miles SSW. of the west end of Ouessant.

To the southward of this bank, SW. from Le Fromveur, about 4 miles from La Jument rock, is a bed of yellow loam at 45 to 50 fathoms. This is the only place where the fishermen can verify position, during fogs, by the nature of the bottom. South of this the bottom is of pebbles, but west

of Les Pierres Noires it is rocky excepting the Basse Occidentale des Pierres Noires, where sand is found at 40 fathoms.

Passage du
Fromveur.

Le Fromveur channel lies between Ouessant island in the west and the plateaux of Bannec, Balanec, and other islands in the east. The least width is a little less than 1 mile, abreast of Men Tensel rock; the depths throughout are 25 to 40 fathoms, rocky bottom, with a little sand in the middle of the southern part.

Directions.

Directions for navigating in the Fromveur channel vary with the stage of the tides, as the currents run through with tremendous velocity. The SE. coast of Ouessant must not be approached nearer than two-thirds of a mile, unless to anchor in the bays described above. Coming from the northeastward, round the east end of Ouessant, when about 1 mile distant, with this end in line with Le Stiff light-tower NW. $\frac{3}{4}$ W., and the Léodoc rock nearly in one with Bannec islet S. $\frac{3}{4}$ E., steer SW. $\frac{1}{2}$ W. for 6 miles, or until the south end of Bannec bears NE. by E. $\frac{1}{2}$ E., or the west end of Ouessant N. $\frac{1}{4}$ W., when, if bound for Brest, a SE. $\frac{1}{2}$ S. course, uninfluenced by the tide, for 11 miles, will lead westward of the Pierres Vertes, and also of the Pierres Noires.

Tides.

It is high water, full and change, at Ouessant at 3^h 32^m. Ordinary springs rise 19 $\frac{1}{2}$ feet, neaps 14 feet.

Currents near
Ouessant and in
the Fromveur.

The current of the flood-tide begins to make at low water; coming from the southwestward it divides into two branches, at 2 or 2 $\frac{1}{2}$ miles off La Jument rock. One sets into Le Fromveur channel, rounds Le Stiff, takes a northwesterly direction until it rejoins the other, when they run together to the northeastward into the English channel. The other branch passes outside La Jument, doubles the Chaussée de Keller, passing 2 miles from Keller island, and finally continues its course northeastward. This lasts throughout the flood-tide.

At half-flood a counter-current is established on the Chaussée de Keller, setting southwestward on Créac'h point and Corn-Pern. This eddy lasts 6 hours, or until half-ebb, when it is slack water for 1 or 1 $\frac{1}{2}$ hours, or even 2 hours during neaps; the regular current of the ebb is then felt until low water. So that inside of 2 miles off the NW. coast of Oues-

sant, there is a current running SW. for 9 hours, interrupted only by about $1\frac{1}{2}$ hours of slack water. Among the rocks close inshore, however, there is still another eddy running NE.

In the Fromveur the current of the flood makes straight through. It lasts 6 hours; but close to the shore of Ouessant it begins at the fourth hour of the ebb, lasting until 2 hours after high water. In mid-channel it attains a speed of 9 knots during spring-tides, and 4 knots during neaps, being most dangerous between Men Tensel and Men-ar-Froud.

To leave the Fromveur channel (in the northward) during the flood-tide it is best to pass rather close to Men Tensel to avoid Men-Corn and other rocks off the eastern point of Ouessant, as the current sets on them during the first three hours of the flood-tide; afterward the direction is more northerly. This obtains during spring-tides.

The middle of the channel should be kept until nearly abreast of Bannec, because a too close approach to the Pierres Vertes would put a vessel in danger of being swept on them or on the shoals to the northward. Caution.

During neap tides the current of the flood runs to the SE. on La Helle and Les Plâtresses, during the first 4 hours, and as it is very swift, advantage is taken of it to beat in against a SE. wind through Le Four and La Helle channels. During the last 2 hours the current sets E., NE. and N., but is much more feeble.

The current of the ebb-tide runs SW. in the Fromveur channel; but during springs it is sometimes met by the beginning of the flood and deflected to NNW. and N. outside the island, before low water. There is more danger with a weather ebb-tide than a weather flood-tide, in the Fromveur. Ebb-tide.

Pilots do not regard this passage as being dangerous; they often take ships through bound for the English channel, and save considerable time.

Vessels bound to Brest generally try to make the landfall at Ouessant island. In clear weather it is indubitably the best; during fogs also it has the great advantage of being high and bold, and with no rocks more than 1 mile to the northward, westward, or southward. In this respect its evident preferableness to the Chaussée de Sein need not Landfall.

be dwelt upon. Vessels coming from the southwestward make Penmarc'h point sometimes, and shorten the course considerably by running through the Raz de Sein. The objections to so doing consist in the danger of being embayed off Audierne, (if in a sailing-vessel,) or of bringing up on Les Glénans.

Thick weather. In attempting to make Ouessant from the westward in thick weather, there are considerations that should be well weighed. Of these the principal is, that the same depths will be found in very different latitudes and longitudes, and therefore the lead would not be a safe nor a convenient guide. Apart from the question of soundings, in case the range of vision were limited to 3 or 4 miles, a very ordinary error in latitude might make the ship pass the island and put her near the other islands and shoals to the eastward, when to a captain unfamiliar with their aspect there would be doubt as to whether they were the rocks of Porsal, the Chaussée des Pierres Noires, or the Chaussée de Sein. There is also the possibility of confounding Ouessant with the Ile de Sein; the danger is very greatly reduced by the establishment of new lights in the vicinity of the latter. (See page 418.)

From whatever point a vessel may come, if it be too thick to sight land 2 miles off, it would be extremely imprudent to run for Ouessant, because the currents in the vicinity are so swift that this distance would not be sufficient to insure clearing the rocks by bringing by the wind immediately; indeed, no vessel should come into less than 70 fathoms water in the vicinity. Coming from the southward only can much assistance be derived from the lead; warning would then be given of the proximity of the Chaussée de Sein or the Chaussée des Pierres Noires. For this reason Ouessant should be approached in longitude.

Soundings on
the parallel of
Ouessant island.

On the parallel of Ouessant the soundings are irregular until reaching longitude $8^{\circ} 05'$ west; they then become more regular, though it will be remarked that the depths, which decrease generally as the island is approached, frequently undergo variations of two or more fathoms, either way. Thus, at 48 miles westward, depths of 72, 71, and 70 fathoms, will be found over a yellowish-white bottom, resembling marl, and covered by a powdery coating present-

ing the appearance of farina mixed with bran, which is intermixed with pieces of shell and a substance like chaff; at 27 miles from the island the same bottom is found at 66 to 63 fathoms, and at less than 9 miles off are depths of 65 fathoms. So not only should a vessel remain in at least 65 fathoms water in thick weather, but should sound frequently.

A very wise precaution taken by many vessels coming from seaward, is to verify their longitude by sounding on the Little Sole bank, latitude $48^{\circ} 30'$ N., longitude $9^{\circ} 20'$ W. For some reasons it may be preferable to do that on the meridian of the Haut-Fond de la Chapelle, latitude $47^{\circ} 35'$ N., longitude $7^{\circ} 20'$ W. In the first place, the distance of the latter from the meridian of Ouessant is about one-half that of the former, and the chances of error in reckoning after leaving it should be in the same proportion. Secondly, to be certain of finding the Little Sole Bank, it is necessary to have the latitude to within 10 miles; while to find the other with uncertain latitude, it is only required to know the longitude to within about 1 degree, proceeding as follows:

Between the meridians of $7^{\circ} 40'$ W. and $9^{\circ} 30'$ W., depths of 110 to 165 fathoms will be found only between the parallels of 48° N. and $48^{\circ} 20'$ N. Being then somewhere between these two meridians, find bottom at between 110 and 165 fathoms by running north or south, as the estimated latitude would advise. That done, and the latitude fixed at $48^{\circ} 10'$ N., within $10'$ either way, run south 20 miles, and then steer east until the same depths are found again, which can only be between the meridians of $7^{\circ} 20'$ W. and $7^{\circ} 30'$ W. The longitude is now known to be within a few miles of $7^{\circ} 25'$ W., and a closer approximation to the latitude may consequently be obtained.

It would be advisable in following the above directions to run out the full 165 fathoms of line, so as to be sure of being within the required limits; because, while the lead may show a greater depth than actually exists, it cannot well show less.

Caution.

Having brought the latitude and longitude both within tolerably narrow limits, should the weather continue thick it might be best to steer E. or ENE., being certain of being

S. of the Chaussée de Sein, and follow the rules given on page 420 for doubling the latter and entering the Iroise.

To make Ouessant coming from the westward.

The following rule for finding Ouessant in a fog, taken from a work by Captain H. de Roujoux, of the French navy, can only be safely applied when the range of vision exceeds 3 miles.

Rule.

Having an approximate knowledge of the latitude, make certain of being to the southward of latitude 48° 15' N., and steer E. until in about 66 fathoms water, and then apply the rules embodied in the following table :

TABLE V.

Soundings reduced to low water.	Courses to be steered, (true.)	Maximum distance between soundings.
Over 60 fathoms	NE	3 miles.
Between 55 and 60 fathoms	NNE	3 or 6 miles.*
Between 49 and 55 fathoms.	NW. or N†....	3 or 6 miles.*
Less than 49 fathoms	W. or NW‡....	6 or 3 miles.

* Six miles, if certain of not being near Penmarc'h point, while running N. or NE.

† Steer north only when certain of not approaching Penmarc'h point.

‡ The 6 miles on a W. course may be changed to 3 miles on a NW. course, when certain of being to the northward or westward of the Chaussée de Sein, as previously explained.

If it be calm weather, the fog trumpet on the W. point of Ouessant may be heard 3 miles, and should at all events be carefully listened for. It is the only one in the vicinity.

Caution.

Should a sailing-vessel adopt this plan, with a southerly breeze, a particularly bright lookout should be kept, and it may be necessary on sighting the island to run through the Fromveur channel, or stand out to the westward. In the latter case a good offing should be made to clear the Chaussée de Keller. The probability of having to do either would be great if the flood-tide be making. With the current and wind from the same direction, there would not be much sea in the Fromveur.

Coming up from the southward, should a glimpse be caught of land not very far ahead, a cast of the lead would determine whether it were Ouessant or Ile de Sein. If the depth were 43 to 50 fathoms, it would be the former, as 27 fathoms is the greatest depth for 7 miles S. of Ile de Sein. It must also be remembered, however, that at 3 miles S. by W. of the western extremity of Ouessant, rocky bottom

Lighthouse



N.W. Lighthouse



Ile d' Ouessant Lighthouse bearing South, distant $5\frac{1}{2}$ miles

would be found at 27 fathoms, on the Haut-Fond d'Ouessant.

Soundings are of little avail to vessels coming from the northward, as depths of 40 and 50 fathoms are found close to without any regularity of decrease from which rules could be deduced. To compensate in part for this, it will be remembered that the N. coast of Ouessant can be approached much closer than the southern, although the same danger exists from the currents, particularly from the Raz du Florus, previously described.

Sighting the island either from the southward or the northward, a glimpse of Créac'h light-tower would be sufficient to identify it, from its being painted in alternate black and white horizontal stripes. Apart from that, the top of the island is nearly level, about 200 feet high in the eastern part, decreasing in height to the westward, and has a few mills scattered over it.

The course to double the Basse Occidentale des Pierres Noires from near La Jument rock, off the S. end of Ouessant, is SE. $\frac{1}{2}$ S., leaving tides out of the question; otherwise, the course will depend upon the speed of the ship in proportion to that of the currents. The shoal should be given a good berth. There are depths, however, of 10 fathoms for one-third mile N., NE., and E. of it. In case of being drifted N. of it, it would be well to sight Pierres Noires light-tower, and pass 1 mile or more S. of it, steering E. by S. parallel with the edge of the Chaussée, finally making the range of Petit Minou and Portzic light-towers.

The Ouessant pilots do not cruise to meet vessels, but only put out on seeing a vessel heading for the island or for the Iroise. It is well, therefore, to make the signal early.

What vessels have most to fear in taking a pilot is being becalmed 2 miles SW. of La Jument at low water, as the current of the flood would set them on the Corn-Pern rocks.

With light SSW. breezes and flood-tide a ship should be hove-to for the pilot at least 2 miles to the westward of the Corn-Pern rocks. The current would be setting outside the Chaussée de Keller. During the ebb-tide there would be nothing to fear.

With N. or NW. winds, heave-to $1\frac{1}{2}$ miles WSW. of La

Coming from
the northward.

Appearance of
the island.

Course from
Ouessant to
Brest.

Pilots.

Taking the pi-
lot.

Jument; with winds from W., remain 3 miles to windward of Corn-Pern; from WSW., 3 miles to windward of La Jument; from S., 3 miles SW. of La Jument; from SE., quite close to Corn-Pern rocks; from E., one-half mile S. of La Jument.

With NW., N., NE., and E. winds the pilots reach vessels quite promptly, but with WNW. to SW. winds they take two hours to go from Lampaul to La Jument. They can make nothing against a head wind and tide.

Chenal du
Four.

The Chenal du Four is formed by the rocks and shoals bordering the coast N. of Saint-Matthieu point, and the vast plateau comprising the numerous islands and rocks between Ouessant and the main-land. The depth is over 7 fathoms N. of Grande Vinotière rock, and 5 fathoms can be kept throughout. From Les Vieux Moines, off Saint-Matthieu point, to Basse Meur, the length of the passage is 11 miles.

Currents.

In the Chenal du Four the tidal currents attain a speed of $4\frac{1}{2}$ knots at springs; during neaps the strength is much less, but abreast of La Grande Vinotière they still run 3 knots. The set of the flood-tide is NNW.; that of the ebb SSE. The latter is first felt, off Kermorvan point, at the time of high water at Brest; at Les Plâtresses one half hour later; between La Grande Vinotière and Béniguet island it sets toward and on Les Bossemen during the first two hours, flowing to the eastward of them afterward.

The current of the flood-tide is first felt off Kermorvan peninsula 1 hour before the time of low water at Brest; at Les Plâtresses 1 hour after, and at Le Four $1\frac{1}{2}$ hours, and at La Helle 2 hours after.

Directions.

When bound through the Chenal du Four from the northward, bring the light-towers on Kermorvan and Saint-Matthieu points in line, bearing SSE. By steering this course a wide berth will be given to the Boureau bank, and a vessel will pass to the westward of Basse Meur, La Valbelle, and Tendoc, and to the eastward of Basse Saint-Louis and Les Plâtresses. On nearing the latter, great attention must be paid to keep the mark on, as the channel between them and La Valbelle is but half a mile wide.

Continue to the SSE. on the above range until 1 mile from Le Conquet light-tower, (on Kermorvan point,) when steer S.

by W. $\frac{1}{2}$ W. for the eastern Bossemen. After making $1\frac{1}{2}$ miles on this course, or when Le Conquet church bears ENE., the ship's head may be laid to pass 1 mile SW. of Saint-Matthieu point. When off the latter, the red buoy of the Basse du Chenal will be seen half a mile in the south-westward, and the course may be gradually changed to SSE. and SE., avoiding Les Vieux Moines, and bringing Petit Minou and Portzie light-towers in range.

Vessels of heavy draught, after steering on the range of Le Conquet and Saint-Matthieu light-towers, should change course to the southward in time to pass 2 cables westward of the black and red tower-beacon on La Grande Vinotière, as to the eastward of it are several patches with not more than $3\frac{1}{2}$ and $3\frac{1}{4}$ fathoms water. Passing La Grande Vinotière, steer for the eastern Bossemen, about S. $\frac{3}{4}$ W. until Le Conquet steeple bears ENE., when shape the course to pass 1 mile from Saint-Matthieu point. Caution.

If bound to the northward through this channel, steer N. $\frac{3}{4}$ E. for Le Conquet light, until that of Saint-Matthieu bears ESE., when a N. by W. course will lead toward the Grande Vinotière, which will be passed to starboard. The ship may then head north, finally making and keeping (astern) the range of the two light-towers. Bound to the northward.

It is tolerably easy to beat through the Chenal du Four with the ebb-tide against a SSE. breeze; but to work up to the northward with the flood-tide against a NW. breeze is less so, as there is generally a bad chop-sea on, particularly during spring-tides. Beating through.

South of the Basse du Chenal the boards may be extended far away to the eastward; in the west the limit is the western Bossemen on with Corsen point, to clear the Basse Large. The Basse Royale (4 fathoms) is included within this limit. Limits of working-room.

Between the Basse du Chenal and the Grande Vinotière, the narrowest part of the channel, the limits are: in the east, Le Conquet light-tower on with Corsen point, excepting near the Basse des Renards, which is cleared by keeping the SE. end of the sand-beach of Portzpoder bay open to the left of Le Conquet light; in the west, La Grande Vinotière beacon slightly open to the right of Goaltock rock.

In beating through the Chenal du Four, the greatest dif- Anchorage.

difficulties a vessel has to contend against are, that the landmarks cannot always be seen, and that the breeze may not be steady. In either case the only resource is to anchor.

At half a mile south of the Basse du Chenal, with Espagnols point (eastern extreme of the southern shore of the Goulet) well open to the right of Petit Minou light, and Le Diamant rock open to the right of Les Cheminées, sand and gravel will be found at 11 to 12 fathoms.

At 3 cables to the southward and eastward of Les Renards beacon, westward of a ruined battery on shore, are depths of $3\frac{1}{2}$ fathoms over sand and shells.

In l'Anse des Blancs Sablons, and all along the coast between the islet north of Kermorvan peninsula and Corsen point, are depths of 8 fathoms, sand, shells, and gravel bottom, at one-half to three-quarters mile off shore. Between the Basse Saint-Pierre and Corsen point is also good holding-ground.

On the range of Le Conquet and Saint-Matthieu lights the anchors generally hold well; the sand bottoms are nearer the land, and rock nearer the islands. North of Les Plâtresses are depths of 22 to 27 fathoms, and between that bank and Kermorvan 11 fathoms.

Chenal de la
Helle.

The Chenal de la Helle is practicable for the largest vessels, and is very convenient for such as seek the Chenal du Four with a SW. wind, after making the northern side of Ouessant. It is formed by the Plateau de la Helle and Les Plâtresses, and is $1\frac{1}{2}$ miles wide and about 3 miles long, NW. and SE. The range leading through is Le Conquet light-tower on with the Pignons de Kéravel, (two white beacons situated half a mile NE. of Saint-Matthieu light,) SE. $\frac{3}{4}$ S. Two shoals nearly in mid-channel, covered by $5\frac{1}{2}$ and 6 fathoms respectively, are avoided by keeping the Pignons a little open to the right of the light-tower.

The limit of the working-room on the SW. side of the channel is Lochrist church slightly open to the northward of Le Conquet light. On the side of Les Plâtresses, the ship should go about at 3 cables from the buoys, or when Saint-Matthieu light-tower is seen midway between that of Le Conquet and the Grande Vinotière tower-beacon.

APPENDIX.

SPAIN.

QUARANTINE.

Ship-owners, before sending their vessels from a British or a foreign port to Spain, should always ascertain if the port of departure is "suspected" by the Spanish quarantine authorities. The fact can usually be ascertained through the columns of the *Shipping and Mercantile Gazette*.

If the vessel is bound for a port on the south or east coast of Spain, and the port of departure is "suspected," it will always be the cheapest plan for the vessel to proceed to Vigo bay and *there* perform the quarantine of seven days.

TONNAGE DUES.

1. All vessels arriving at Spanish ports in ballast are now admitted free of all port dues and charges whatever; consequently British ships conveying outward freights to the western ports of France can proceed to the northern ports in Spain for cargoes of iron-ore, &c., and then compete with French vessels in the carrying-trade to Great Britain.

2. In lieu of the former charges of light, anchorage, loading and unloading, entrance, consumption, and pratique dues, a uniform charge is now made of 10 reals per 1,000 kilograms ($1,015\frac{1}{2}$ kilograms=1 ton) on all cargoes imported; and the exportation of goods and native produce is free of port dues. Vessels ordered into quarantine have to pay one-fourth of a real per register ton per day.

3. Vessels with cargo in transit are free. When chartering for Spain, ship-masters should bear in mind that they are liable to pay the import duty of 1s. (5 reals) per ton of 1,000 kilograms on cargo delivered, unless otherwise stipulated in the charter-party. The following clause would pro-

vide against this: "The consignee shall pay the duty required by the Spanish customs." Vessels proceeding from one Spanish port to another are also liable to the same charge.

Ballast tax.

By a decree of the 9th of March, 1872, this tax is abolished in all Spanish ports.

SPANISH CUSTOMS REGULATIONS.

1. All captains of vessels, on entering Spanish waters, (11 kilometers 111 meters, or 6 miles from the coast,) are obliged to have, ready drawn up, a manifest in Spanish, French, English, or in the language of the nation to which the ship belongs, and to present the said manifest to the custom-house officers if called upon to do so.

In the said manifest shall be set forth:

(1.) The class and name of the vessel, her tonnage, nationality, and crew, the name of the captain, and the port or ports from whence she comes.

(2.) The port or ports of destination of the goods.

(3.) The number, class, marks, and numeration and gross weight, in kilograms, of all packages on board, including the venture goods brought by the crew on their account, the class and kind of goods, and the names of all the shippers and consignees, or a statement that the goods come to order—all separately for each port of destination. Passengers can only be consignees of the goods they carry with them, the duty on which must not exceed 250 pesetas, and the crew can only be consignees of their venture goods, the duty on which must not exceed 100 pesetas.

The number and weight of the packages shall be set forth in words and figures.

The word "merchandise" and similar vague expressions shall not be used. Loose cargoes shall be set forth according to their weight, tale, or measure.

(4.) The total number of passengers and their packages separately for each port of destination.

(5.) The class and quantity of iron carried as ballast; and,

(6.) The ship's provisions and stores, and the effects for the defense of the vessel. The surplus provisions shall be landed officially under the prescribed formalities, if the captain refuses to pay the duty.

With regard to tobacco, one kilogram for each member of the crew, and three for the captain, are allowed to be brought as rations, and shall remain deposited on board the vessel. The captain may bring as much as three kilograms for each member of the crew, declaring them as surplus rations, in which case the tobacco shall be deposited in the custom-house until the vessel sails.

If he brings larger quantities of tobacco he shall pay the tariff duty on the excess.

In the case of damage to the goods, the captain shall state at the bottom of his manifest that he has made, or intends to make, the necessary protest before the court which takes cognizance of commercial matters, at the first port at which he may touch, of which protest he shall present legal testimony to the administrator of the custom-house within three days after the admission of the vessel to free pratique. Bulk shall not be broken until the above formalities are concluded.

If the captain has not the manifest drawn up on entering Spanish waters, or does not present it on receiving the entrance visit, he is liable to a fine of 1,000 pesetas.

If the manifest be defective, the fine shall range from 100 to 1,000 pesetas.

2. The captain shall also present, on arrival, or be liable to a fine of 100 pesetas, a list of the names of the passengers who are to land at the port, and of the number of packages belonging to each one, setting forth also the quantity of tobacco belonging to them.

3. The captain shall admit on board his vessel a guard of custom-house officers, and shall allow the administrator of the custom-house, or person appointed by him, to make one or more examinations of the vessel to place the official band on, and to seal the hatchways, bulkheads, and other departments, and to examine the log-book, inventory, bills of lading, and other papers on board, which the captain shall at once hand over on being called upon to do so.

4. The captain shall within twenty-four hours, counting from the admission of the vessel to free pratique, present two copies of the manifest in Spanish and on the paper prescribed for that purpose. If he neglects to do so, or if the copies do not agree with the original, he is liable to a fine

of 250 pesetas, and must also present them, or make them again, according to circumstances. If the vessel be going to several ports, the copies shall be three, in order that one of them, authorized by the administrator, may be presented at the transit custom-houses, so as to avoid a fine of 500 pesetas. The captain will be responsible for discrepancies.

With regard to the said custom-houses, the captain shall only include in the copies of the manifest, to be presented within the space of time and in the form aforesaid, the goods for each custom-house; and if the copies do not agree with the general manifest he shall pay a fine of 50 pesetas, and be obliged to make fresh copies.

5. No made-up clothes or woven goods can be carried in transit except in vessels which, measuring at least 120 metrical tons, come to our ports to complete their cargoes for America or Asia.

Nor will the carrying of prohibited merchandise be permitted, with the exception of the various kinds of tobacco coming from abroad, which will be allowed under the following conditions:

1. The vessel must be a steamship, and be of at least 300 tons burden.

2. The master must be provided with a certificate of the Spanish consul at the port of shipment, in which must be inserted the number, class, marks, numeration, and gross weight of the packages, the quantity and quality of the tobacco, the name of the shipper, and of the port of destination, and this certificate shall be viséd at all the Spanish transit custom-houses.

3. The same particulars must be stated in the captain's manifest, and it will be necessary for the captain to enter into a bond at the first custom-house at which he touches, in order to prove the discharge of the cargo at the port of destination, together with a certificate of the Spanish consul, and this bond must be at the rate of 14 pesetas per kilogram, whatever be the class or real value of the tobacco.

4. That the port of destination shall not be the port of lading, nor any of those at which the ship may have touched during her voyage.

5. That on the wrappers of the packages must be noted

the gross weight of each, which must be in no case less than 46 kilograms, as well their destination.

6. That all packages must be placed in the ship's hold, properly separated, so that they may be easily examined at the transit custom-houses.

The transit of other merchandise will be permitted in vessels, either steam or sailing, under the condition of their not being of less than 300 metrical tons, with no other restriction except that the port of destination be not the port of lading or any one at which the vessel may have touched during her voyage.

No ship shall touch at any Spanish port which is not habilitated for the goods she may have on board, unless forced to do so by circumstances beyond her control, which must be stated and proved in due form without relieving the captain from the obligation of presenting immediately his manifest. In this case the customs-officers are to be admitted on board, and they will not allow the loading or unloading of any merchandise.

7. Moreover, the captain will incur a fine in the following cases, and to the following amounts :

1. For changing his anchorage without permission of the customs authorities, he shall pay from 50 to 250 pesetas, and shall not be allowed to leave until they are presented.

For not inserting in the manifest the lingots of iron carried as ballast, or for not stating their weights correctly, the captain shall pay from five to ten times the tariff dues, according to the increase or decrease.

4. When ship's stores are not reported in the manifest, the captain shall pay from five to ten times the corresponding tariff dues.

5. For each package reported in the manifest and not found on board, the captain shall pay 750 pesetas.

6. For each package that is found on board and not reported in the manifest, the captain shall pay from five to ten times tariff duties on the article contained therein.

7. For the breakage, removal, or alteration of official seals or bands on the hatchways, the captain shall pay 250 pesetas in addition to any other penalty he may have incurred.

8. For breaking official bands placed on packages on

board, the captain shall pay 750 pesetas, as well as any other fines he may have incurred.

9. For unloading, without the customs' permission, goods reported in the manifest, the captain shall pay double duties, and if the same were not reported, from five to ten times the duties.

10. When the consignees' declaration as regards loose cargo agrees with the result of the custom-house examination, and a decrease is found in the manifest, the captain shall pay double duty for the difference. If the difference should be an increase, he shall pay duty on the excess as shown in the manifest.

11. For an excess in the gross weight of more than 10 per cent., the captain shall pay ten times the unlading dues, and he shall pay the same for excesses occurring on the same scale in loose cargoes, as well as any other fines he may have incurred according to the foregoing rule.

12. For each package declared in transit, and not found at the time of the search, the captain shall pay 750 pesetas; and in the case of loose cargoes, from five to ten times the tariff dues on the missing part.

13. For each package found on board, and not reported in the transit manifest, the captain shall pay from five to ten times the tariff duties on the same.

14. For the transfer from one vessel to another, without customs' permission, of foreign goods liable to duty, for goods of the country liable to exportation dues, the captain shall pay from five to ten times the tariff duty.

15. For the same fault in the case of foreign or national goods duty free, the captain shall pay from 50 to 500 pesetas, at the administrator's discretion.

16. For discrepancies as regards packages, or goods in loose cargoes, discovered during transshipment to have been omitted in the manifest, see cases 5 and 6 of this rule.

17. If the transshipped goods are not found on board of the receiving-ship after clearance, the captain will pay 750 pesetas for each package, and from five to ten times the duty in the case of loose cargoes.

18. The captain will pay double or quadruple duties in the following cases:

(1.) For manufactured tobacco not reported in the manifest.

(2.) For surplus stores which remain on board, or are re-embarked and are not to be found on the outgoing visit being made.

(3.) If tobacco, stated to be carried in transit, be not found on the anchorage visit being made.

19. The conveyance of leaf-tobacco is prohibited. Any tobacco of this sort found on board, except in the case provided for by rule 5, will be confiscated, and the captain shall pay a fine of from twice to four times the tariff duty.

20. Tobacco of all kinds brought in transit to a licensed port in ships of less than 300 metrical tons, will be confiscated, and the captain shall incur a fine of from twice to four times the duty.

SPANISH TONNAGE.

Rule for ascertaining a vessel's Spanish tonnage: Let A be the length from stem to stern-post; B the breadth, measured across the main deck amidships; C the breadth, but measured outside, that is, including the thickness of the sides of the vessel; D, depth of hold:

$$\text{Then the Spanish tonnage} = \frac{\frac{1}{4} \cdot (A + 3B) (C) (D)}{70.19}$$

or, one-quarter of the length added to three times the inside breadth, multiplied by the outside breadth and by the depth of hold, divided by 70.19. If the depth of the space between decks should be less than 6 feet, 10 per cent. will be added; and if more than 6 feet, 14 per cent. If vessels of larger burden, without inside boarding, 8 per cent will be added. If with much dead rise of floor-timbers, 5 per cent. will be deducted. Spanish tons may be found also by adding 23 per cent. to the British register tonnage.

Table for the reduction of English avoirdupois weight into kilograms.

The weight now adopted by the Spanish custom-house authorities in the island of Cuba.

English pounds.	Kilograms.*	French or Spanish kilograms.	English pounds.	Kilograms.*	French or Spanish kilograms.
1	$\frac{3}{7}$	0.4536	51	$23\frac{1}{7}$	23.1323
2	$\frac{9}{10}$	0.9071	52	$23\frac{2}{5}$	23.5858
3	$1\frac{1}{3}$	1.3607	53	24	24.0394
4	$1\frac{4}{6}$	1.8142	54	$24\frac{1}{2}$	24.4929
5	$2\frac{1}{4}$	2.2679	55	25	24.9466
6	$2\frac{3}{4}$	2.7214	56	$25\frac{2}{5}$	25.4001
7	$3\frac{1}{6}$	3.1750	57	$25\frac{6}{7}$	25.8537
8	$3\frac{3}{5}$	3.6286	58	$26\frac{1}{3}$	26.3073
9	4	4.0823	59	$26\frac{2}{4}$	26.7614
10	$4\frac{1}{2}$	4.5357	60	$27\frac{1}{5}$	27.2144
11	5	4.9893	61	$27\frac{2}{3}$	27.6680
12	$5\frac{3}{7}$	5.4428	62	$28\frac{1}{8}$	28.1215
13	$5\frac{9}{10}$	5.8964	63	$28\frac{3}{5}$	28.5751
14	$6\frac{1}{2}$	6.3499	64	29	29.0286
15	$6\frac{2}{5}$	6.8036	65	$29\frac{1}{2}$	29.4823
16	$7\frac{1}{4}$	7.2571	66	30	29.9358
17	$7\frac{3}{4}$	7.7107	67	$30\frac{2}{5}$	30.3894
18	$8\frac{1}{6}$	8.1643	68	$30\frac{6}{7}$	30.8430
19	$8\frac{3}{5}$	8.6180	69	$31\frac{1}{3}$	31.2967
20	9	9.0715	70	$31\frac{2}{4}$	31.7501
21	$9\frac{1}{2}$	9.5251	71	$32\frac{1}{5}$	32.2037
22	10	9.9786	72	$32\frac{2}{3}$	32.6572
23	$10\frac{2}{5}$	10.4322	73	$33\frac{1}{9}$	33.1108
24	$10\frac{6}{7}$	10.8857	74	$33\frac{4}{7}$	33.5643
25	$11\frac{1}{3}$	11.3394	75	34	34.0180
26	$11\frac{3}{4}$	11.7930	76	$34\frac{1}{2}$	34.4715
27	$12\frac{1}{4}$	12.2465	77	35	34.9251
28	$12\frac{3}{4}$	12.7001	78	$35\frac{3}{8}$	35.3787
29	$13\frac{1}{5}$	13.1538	79	$35\frac{6}{7}$	35.8324
30	$13\frac{2}{5}$	13.6072	80	$36\frac{1}{4}$	36.2858
31	14	14.0608	81	$36\frac{3}{4}$	36.7394
32	$14\frac{1}{2}$	14.5143	82	$37\frac{1}{5}$	37.1929
33	15	14.9679	83	$37\frac{2}{3}$	37.6465
34	$15\frac{2}{5}$	15.4214	84	38	38.1000
35	$15\frac{6}{7}$	15.8751	85	$38\frac{5}{7}$	38.5537
36	$16\frac{1}{3}$	16.3286	86	39	39.0072
37	$16\frac{3}{4}$	16.7822	87	$39\frac{6}{7}$	39.4608
38	$17\frac{1}{4}$	17.2358	88	$39\frac{9}{10}$	39.9144
39	$17\frac{2}{3}$	17.6895	89	$40\frac{1}{3}$	40.3681
40	$18\frac{1}{7}$	18.1429	90	$40\frac{4}{5}$	40.8215
41	$18\frac{5}{8}$	18.5965	91	$41\frac{1}{4}$	41.2751
42	19	19.0500	92	$41\frac{3}{4}$	41.7286
43	$19\frac{1}{2}$	19.5036	93	$42\frac{1}{5}$	42.1822
44	20	19.9571	94	$42\frac{2}{3}$	42.6357
45	$20\frac{2}{5}$	20.4108	95	43	43.0894
46	$20\frac{6}{7}$	20.8643	96	$43\frac{1}{2}$	43.5429
47	$21\frac{1}{3}$	21.3179	97	44	43.9965
48	$21\frac{3}{4}$	21.7715	98	$44\frac{6}{7}$	44.4501
49	$22\frac{1}{4}$	22.2253	99	$44\frac{9}{10}$	44.9038
50	$22\frac{2}{3}$	22.6787	100	$45\frac{1}{8}$	45.3576

Table for the reduction of English avoirdupois weight into kilograms—Continued.

English pounds.	Kilograms.*	French or Spanish kilograms.	English pounds.	Kilograms.*	French or Spanish kilograms.
101	45 $\frac{4}{5}$	45.8112	107	48 $\frac{1}{2}$	48.5326
102	46 $\frac{1}{4}$	46.2647	108	49	48.9862
103	46 $\frac{3}{4}$	46.7183	109	49 $\frac{3}{7}$	49.4399
104	47 $\frac{1}{6}$	47.1718	110	49 $\frac{7}{8}$	49.8933
105	47 $\frac{2}{3}$	47.6255	111	50 $\frac{1}{3}$	50.3469
106	48	48.0790	112	50 $\frac{4}{5}$	50.8006
Cwt.			Cwt.		
1	50 $\frac{4}{5}$	50.8006	11	558 $\frac{4}{5}$	558.8071
2	101 $\frac{3}{5}$	101.6012	12	609 $\frac{3}{5}$	609.6077
3	152 $\frac{2}{5}$	152.4018	13	660 $\frac{2}{5}$	660.4083
4	203 $\frac{1}{5}$	203.2024	14	711 $\frac{1}{5}$	711.2089
5	254	254.0050	15	762	762.0095
6	304 $\frac{4}{5}$	304.8036	16	812 $\frac{4}{5}$	812.8101
7	355 $\frac{3}{5}$	355.6042	17	863 $\frac{3}{5}$	863.6107
8	406 $\frac{2}{5}$	406.4048	18	914 $\frac{2}{5}$	914.4113
9	457 $\frac{1}{5}$	457.2054	19	965 $\frac{1}{5}$	965.2118
10	508	508.0065	20	1016	1016.0130

These tables have been calculated on the basis of 1 kilogram = 2.2047 pounds English avoirdupois.

The columns marked thus * give the equivalent for English pounds in vulgar fractions as nearly as required for ordinary purposes, which may be considered quite sufficient for the general requirements of commerce.

For more accurate calculations the exact equivalent of the English weight stands by the side, giving the number of kilograms with four decimals.

MONEY.		
Spanish.	English.	American.
1 real	2 $\frac{1}{2}$ d.	5 cents.
1 peseta	10d	20 cents.
10 reals }	2s. 1d	50 cents.
1 escudo ... }		
20 reals }	4s. 2d	1 dollar.
1 duro }		
1 doubloon ...	£3 6s. 8d.....	16 dollars.

FRENCH TONNAGE DUES.

MEASURES.		WEIGHTS.	
Spanish.	English.	Spanish.	English.
1 pulgada	0. 926 inch.	1 onza	0. 064 pounds.
1 sesma	5. 564 inches.	1 marco	0. 508 pounds.
1 pie	11. 128 inches.	1 libra	1. 016 pounds.
1 vara	33. 384 inches.	1 arroba	25. 402 pounds.
<i>Liquid.</i>		1 quintal	101. 610 pounds.
1 arroba	4 gallons, 1 pint.	1 tonelada	2, 032. 2 pounds.
1 quartillo	$\frac{1}{8}$ gallon.		

NOTE.— Measures and weights now in use same as those of France.

In Spain, accounts are kept in reals and cents. English gold and silver do not pass current. The coins are :

	Dollars.		Reals.
Gold Isabella, 100 reals	5	Silver $\frac{1}{2}$ dollar	10
Gold piece of 80 reals	4	Silver peseta	5
Gold piece of 40 reals	2	Silver peseta	4
Gold piece of 20 reals	1	Silver $\frac{1}{2}$ peseta	2
Silver dollar, 20 reals	1	Silver coin of	1

There are sometimes also doubloons and half-doubloons in circulation, and French five-franc pieces of silver, which pass currently for 19 reals, called always in Cadiz, Napoleons.

FRANCE..

TONNAGE-DUES.

Extracts from French shipping-laws.

“ART. 4. The tonnage-dues at present levied on foreign vessels entering the ports of the empire shall be abolished from the 1st of January, 1867.

“The tonnage-dues at present levied on French and foreign vessels, and applied as a guarantee for the payment of loans contracted for work for improvements in the ports of France, are, however, maintained.

“ART. 6. In the event of French vessels being, in a foreign country, subject, in the interest of the government, town, or corporation directly or indirectly, for navigation, or the importation or exportation of merchandise, to dues or charges from which the vessels of that country should be exempted, imperial decrees may establish on vessels of the

said nation entering the ports of the empire, or of a French colony or possession, and on the merchandise they have on board, such duties or differential charges as should be considered necessary to compensate for the disadvantages to which French vessels may be subject."

Dues passed by the republic, February, 1872:*

"ART. 5. The duties per ton measurement on the importation of sea-going vessels are fixed as follows: Rigged sailing-vessels—wood, 40 francs; wood and iron, 50 francs; iron, 60 francs. Steamers the same as above, with the addition of the duty on the engines. Hulls—wood, 30 francs per ton; wood and iron, 40 francs; iron, 50 francs.

"These duties shall not be applicable to vessels which shall be proved to have been purchased previous to the promulgation of the present law.

"ART. 6. Vessels of all nations, from foreign countries or the French colonies and possessions, laden wholly or in part, shall pay as quay dues a fixed tax per ton measurement, as follows:

"From Europe or ports of the Mediterranean, 50 centimes.

"From all other countries, 1 franc.

"ART. 7. Articles 1, 3, and 5 of the law of May 19, 1866, are abrogated."

CUSTOMS DUES AND REGULATIONS.

All goods landed or shipped pay a tax or duty ("droit de statistique") of 10 centimes per package, or, as regards merchandise in bulk, on every cubic metre.

Bills of lading on goods, arriving from or leaving for foreign countries, pay a stamp-duty of 2 francs 40 centimes; from or to French ports, 1 franc 20 centimes; but each bill of lading must only contain the name of one consignee; if it contains more, 60 centimes is charged on every additional name mentioned.

All merchandise, the produce of countries out of Europe, on importation from entrepôts or bonded stores in Europe, pay a duty (surtaxe d'entrepôt) of 30 francs per ton, if not

* Articles 1, 2, 3, and 4, establishing a differential duty ("surtaxe de pavillon") on cargoes by vessels of British and other nationalities, have since been abrogated, (July, 1873.)

already, by earlier laws, liable to heavier entrepôt surcharges.

Manifest.

No vessel can import merchandise into a French port without a manifest and copy signed by the *master only*, the copy to be delivered up to the officer of customs who may board the vessel. Penalty, for lack of manifest, or refusal of the same, 1,000 francs. Vessels in ballast do not require a manifest. For every package short of the number on the manifest, a fine of 300 francs. For any over and above, a fine of 1,000 francs is incurred.

Report and entry.

The master of every merchant vessel, whether in ballast or with cargo, must make the report and entry of the vessel and cargo within twenty-four hours after arrival, under a penalty of 500 francs.

Masters of vessels speaking and writing French, can do their business at the custom-house without a broker. The manifests of ship-masters speaking French, though written by another person, are receivable at the custom-house, without the intervention of a broker, as long as the master signs and presents it in person.

For all that concerns the business of the ship, the owner, charterer, or sole consignee can be represented at the custom-house by a shipping-clerk; and it is only when disputes arise, and cases are carried before the law-courts, that a ship-master is obliged to avail himself of the services of a broker for the translation of documents.

Sea protest.

The sea protest must be deposited at the custom-house, with the report and entry, by all vessels coming from the United States, and, also, by all British vessels coming from the United Kingdom, or British possessions in Europe, to prove that they arrive directly therefrom, and to show the events of the passage, which may be the cause of damage to the cargo. By this proceeding the vessel may obtain the immunities or reduction of duty on the cargo in consequence of such damage. The above rules are all applicable to vessels putting into French ports wind-bound, in distress, or from other causes.

HARBOR REGULATIONS.

All vessels putting into, or departing from, a port of France, shall hoist their national flag.

All vessels on arriving in a port shall have their sprit-sail yards, dolphin-strikers, and flying-jib-booms rigged in, jib-booms ready to come in, sails clewed up, lower yards cock-billed, draught of water given to the port-officers, warps and hawsers ready, and the master, to the best of his judgment, or by a verbal order of the port-officers, shall take all other necessary measures to prevent any accident.

No anchor must be slipped in the fairway, and when slipped in any other part of the harbor must be fitted with a buoy and buoy-rope.

Any vessel taking ground before reaching the proper place of mooring, shall have the top-gallant masts and top-masts lowered, the boats launched, and the master, to the best of his judgment, or by a verbal order of the port-officers, shall take all other precautions to prevent any accident.

Every master arriving in port shall, after conforming to the sanitary regulations, within twenty-four hours make a report in writing to the port-officers of the name of the vessel, tonnage, number of crew, and the nature of his cargo.

Vessels shall be berthed in the docks by priority of entry, according to the order of reporting at the custom-house, to the nature of their cargo, their draught of water, and the custom of the port.

When a vessel on entering may require to let go her anchors in the tidal basin, such anchors shall be picked up within twenty-four hours by the crew, or at the ship's expense, and deposited on board, if the vessel be at hand, or on the quay, if the vessel cannot or will not receive them.

The larger steam-vessels, arriving and departing at fixed dates, shall have the precedence over all other vessels, both inward and outward.

Besides the two signal-guns fired by them on arriving and departing, their arrival and departure shall be announced to all other vessels by a flag, that each one may bring-to, or delay entering or departing, as the meaning of the signal shall prescribe.

Vessels lying aground in the tidal basin, either to await the tide to enter the docks, or for a favorable wind, or for any other motive, shall not remain moored to the buoys nor aground in the channel of the port. A light shall be

placed at sunset at the extremity of the vessel nearest the channel.

A master must be in person on board his vessel, on entering into, or departing from, any port, haven, or river. In case of non-observance of this law, the master shall be responsible for all accidents to all persons interested in the vessel and in the cargo.

Entering and
leaving dock.

The national flag hoisted on the bridges shall indicate that the locks are to be opened.

Unless from urgent circumstances, the gates shall not be opened, either before the rising or after the setting of the sun, or during tempestuous weather. Nevertheless, at periods when the full tide serves before the rising or after the setting of the sun, should there be vessels to enter the docks or depart therefrom, and should the weather permit, the gates shall be opened once in twenty-four hours. The tide closely preceding the rising, or that less distant from the setting of the sun, shall be preferred.

Vessels entering the docks shall bring up as much as possible opposite the entrance before high water, head first. The master, who must always be on board while thus moving the vessel, shall receive from the port-officers the necessary orders when passing the locks and bridges. The port-officers shall determine the number of haulers necessary, that the vessel may pass through the locks as rapidly as possible.

The master shall not discharge his pilot and assistance-boat until the vessel be moored at the place indicated. He shall not come-to on the passage. While proceeding to his berth, he shall, immediately after passing through the lock of the dock in which he is to discharge, finish taking in all sails and booms, cock-bill the lower yards, brace or cock-bill the topsail yards, and take such other precautions as may be ordered by the port-officers, in default of which the berth may be refused.

In dock.

The preceding measures serve also for vessels departing.

Whenever the sluices are opened, it will be indicated during the preceding full-tide by a blue flag, hoisted and withdrawn at the proper time by the lockmen on the bridge of such docks, wherein the water shall be lowered; the port-

officers shall take the necessary measures to prevent accident.

No movement can be made except with the permission of, and in conformity to, the orders of the port-officers.

Every master must proceed to the berth assigned to him by the port-officers. In hauling to the berth, the necessary precautions must be taken not to damage the quay.

No vessel can be moored elsewhere than to the rings or posts placed for that purpose; the warps will be placed as low as possible to prevent accidents. If vessels be moored with chains, they must have boards under them to protect the flags of the quay; and further, they must be made fast with rope, and not with shackles, to be let go more quickly in case of fire.

Every vessel must have proper fenders to prevent damage, and allow a free passage to those vessels lying off, and receive their hawsers and let go their lines to facilitate the movements of other vessels.

It is forbidden to leave sails unfurled during the night. In case of storm every master or watchman must double the moorings, and have the top-gallant masts lowered.

Every master shall cause the quay before his vessel, and half the space between his vessel and the next, to be swept each day at the end of the work; the sweepings shall be heaped, and in no case nor under any pretext shall be thrown into the tidal basins or docks.

Every vessel must have the national flag hoisted on Sundays and holidays, and whenever the flag of the port may be hoisted.

SHIPMENT AND UNSHIPMENT.

The space reserved on the quays for circulation must always remain clear.

The goods of each vessel may remain deposited on the other space during the time allowed them for loading and unloading.

Every vessel duly reported that may be detained in the tidal basin from any unavoidable cause, will be considered as if in dock. However, such vessels shall only have precedence over those vessels not unloading.

For loading, applications will be received only from the

day when the vessel is completely discharged and all repairs finished.

No goods to be landed are allowed to be cast from the vessel to the quay; goods must be landed with the tackle or by hand.

All heavy goods must be placed on planks.

Stones, plaster, metals, and other like goods cannot be landed or shipped unless the flags be covered with planks.

No tiles, bricks, plaster, chalk, clay, sand, coal, &c., can be loaded, shipped, or transshipped, without having from the quay to the ship's side a tarpaulin in good condition and made well fast.

Each evening, at the expiration of work-hours, trucks, ladders, planks, and other articles employed in loading and unloading, must be removed outside the mooring-posts.

Before leaving the quay, the master shall cause the space occupied by the goods while loading or unloading to be properly swept.

SHIPPING AND UNSHIPPING BALLAST.

It is forbidden to throw ballast overboard in the harbors, canals, docks, and roadsteads, or to have it carried elsewhere than to the place indicated by the port-officers.

Ballast must not be shipped or landed previous to the application in writing to the port-officers. The application must contain the name of the master and vessel, the place where the vessel is lying, the quantity and kind of ballast required.

It is forbidden to every master to give his ballast to another, or to reship that landed previous to the state of such ballast being examined by the port-officers, who may refuse such permission.

Iron ballast and iron-stone ballast are excepted in the preceding measures.

It is forbidden to ship or land ballast during the night, unless by special permission of the port-officers.

The shipping and unshipping of ballast incur the obligation already mentioned—to make use of a sail or tarpaulin in good condition and well fastened.

In the shipping and landing of ballast, baskets must be used.

Ballast deposited on the quay must be shipped or removed the same day.

No vessel having shipped or landed ballast can leave her berth previous to the quay being swept and properly cleaned.

STEAM-VESSELS.

Steam-vessels shall be under the superintendence of the port-officers for all that concerns the fires, cleaning the funnels, the regulations of departure and arrival, berths and moorings, and the safety of passengers.

The master of every steam-vessel must have the fires extinguished on arrival into the basin. As soon as the steam-vessels are moored the port-officers or their assistants shall proceed on board to ascertain that every necessary measure has been observed.

Every steam-vessel departing within nine hours after arrival may keep the fires going.

Whenever a steam-vessel is ready for sea, the master, in giving notice thereof, must make known the hour he shall light the fires, which is to be done in the presence of the port-officers or their assistants, who shall remain on board until the steam-vessel shall leave the quay.

Steam-vessels arriving daily may be exempted from these obligations.

If the departure of a steam-vessel be postponed the fires must be immediately extinguished, as mentioned in a preceding article.

Whenever the passage of a steam-vessel, arriving or departing, is obstructed by other vessels, such steam-vessel must slow-down, and only preserve the speed absolutely necessary to steer. Steam-vessels remaining in the tidal basin shall not be swung until the channel be entirely free, and no vessel arriving or departing.

Whenever there may be danger to a vessel, or the channel be obstructed, the port-officers may in such case employ any steam-vessel to give assistance. The expenses will be borne by the vessel towed or assisted.

Steam-vessels are likewise subject to the same regulations as other vessels, for all rules not here annulled.

MEASURES AGAINST FIRE.—SMOKING VESSELS.—FIRE ON BOARD.

1. No vessel is allowed to enter basins with guns or other fire-arms loaded. If there be on board gunpowder or rockets, the master must make a report thereof to the port-officers, who will superintend the immediate landing and the deposit of the same at the powder-magazine, or at such other place as may be appropriated to that purpose.

Packet-vessels having signal-guns on board, and making a report of the gunpowder, will be allowed on board twelve charges.

2. Vessels partly or entirely laden with saltpetre or sulphur, the masters must, before mooring to the quay, make a report, under a penalty of all damages and accidents that the nature of the cargo may occasion, without prejudice to prosecution.

Such vessels must proceed immediately, showing a red flag at the mast-head, to the place indicated by the port-officers.

In the shipment and unshipment of sulphur, wooden-shovels alone shall be employed; the use of iron shovels is strictly forbidden.

3. It is forbidden to have fire on board vessels, or on the quay inside the mooring-posts, or near the tents or merchandise; to have a light otherwise than in a lantern; to carry on board shells, heated irons for pitch and other purposes; and to smoke.

The preceding regulations may be departed from, smoking excepted, in virtue of a written permission to be given by the port-officers.

Permissions shall be granted whenever necessary, on condition that every measure be taken to prevent accident, subject to the superintendence of the port-officers or assistants.

4. Watchmen, on board vessels laying-up, shall have, at all times, two tubs of water on deck.

5. In case of fire in the town, the masters must assemble their crews, and have their sails clewed up.

6. In case of fire on board a vessel, the master or watchmen shall immediately acquaint the port-officers. To them belongs the direction of all assistance. They may employ

the crews of other vessels to give assistance where there is danger. The measures prescribed by the preceding article shall be observed by the masters, watchmen, and seamen on board.

7. Whenever it is necessary to smoke a vessel, or to heat the bunkers, notice shall be given to the port-officers, who shall fix the place and time. A master-caulker shall be employed under the direction of the port-officers.

8. No vessel shall be breamed until notice is given to the port-officers by the master thereof.

9. In all cases the breaming shall be done by a master-caulker, under the superintendence of the port-officers.

During the time of breaming men shall be posted fore and aft, with buckets of water, to besprinkle the lanyards and moorings, and to watch the fire.

As soon as the breaming is done, the master shall examine the interior of the vessel and assure himself that no fire has entered therein.

10. It is forbidden to heat pitch or tar elsewhere than at the place appointed by the local authorities, and indicated by the port-officers.

QUAYS.—LOCKS.—BRIDGES.

1. The pilots and masters are responsible for damages done by their vessels to the quays, locks, bridges, &c., of the ports, except from unavoidable causes.

2. It is forbidden to leave chain cables on the flags of the quays without being placed on planks.

3. It is forbidden: (1.) To cast unwholesome liquids, earth, rubbish, and all other materials, into the harbor or docks. (2.) To deposit any materials on that part of the quays reserved for the circulation, under a penalty of the same being removed at the expense of such persons, without prejudice to prosecution for the like contravention.

4. It is forbidden to all persons to cast off or cut any warps used in moving or mooring vessels.

PORT OFFICERS AND MASTERS.

1. The port officers and masters shall regulate the order of entry and departure of vessels in the harbors and docks,

and the berth for each vessel, and superintend all the movements thereof.

They shall superintend the shipping and landing of ballast.

They shall prescribe the necessary measures for smoking, breaming, caulking, repairing, and breaking up of vessels.

2. The port-officers and masters shall inform the masters of vessels, pilots, and others, of such measures of safety and order, and regulations required to be observed, or that may be prescribed by the present regulations.

3. The port-officers and harbor-masters may, in cases of necessity, without further notice than two verbal injunctions, cut or cause to be cut, the moorings that masters of vessels or others may refuse to let go.

4. Whenever the port officers and masters shall cause to be executed any work, the expenses thereof to be borne by such vessel, they shall make a statement of the expenses to be approved by the prefect.

5. The port officers and masters must always be in uniform while in the execution of their duty.

6. On penalty of dismissal, and under no pretext whatever, shall the port officers and masters exact or accept any indemnity, contribution or gratuity, other than the fees allowed by article 3 of the decree of July 15, 1854.

EXTRACTS FROM THE PILOT REGULATIONS FOR THE PRINCIPAL FRENCH PORTS.

If a vessel conducted by a pilot into port arrive from a country suspected of contagion, and the said vessel be therefore not admitted to pratique, the pilot must conduct the vessel to the place set apart for the sanitary measures and visits, without communicating with her, if it be possible.

Pilots shall conduct these vessels first in the offing, and in consequence it is forbidden to give the preference to those at a greater distance, under a penalty of 25 francs. Should one of the vessels in sight be in distress, however, the pilots are then obliged to board her first, every vessel in danger requiring to be assisted in preference to any other.

If a pilot board a vessel having a fisherman on board, be-

fore the dangers are passed, he shall be received, and the salary of the fisherman be deducted from that of the pilot, according to the distance he may have conducted the vessel.

Immediately on a pilot boarding a vessel, the master thereof is obliged to give him the draught of water of such vessel, under a penalty of liability for all damage if it be 12 inches less than the actual draught.

The master shall likewise make known to the pilot the vessel's rate of sailing, her qualities and defects, that he may in consequence be able to work the vessel.

The masters of French and foreign vessels shall be at liberty to take such pilots as they think fit, to enter into any port or river without being subject on departing therefrom to employ the same pilots.

The masters of vessels and pilots who may be compelled by hurricane or other accident to slip their cables and leave their anchors in the roadstead, are obliged to fasten thereto, if possible, buoy-ropes and buoys in good condition, and capable of raising such anchors, and to make a report thereof.

The anchors and cables shall be picked up as soon as the weather may permit, by the pilots, and conducted to the vessels to which they belong if not previously weighed by the ship's crew.

Whenever such anchors shall be picked up there shall be paid for salvage—

By French vessels:

If the anchor be without a buoy, one-fourth of the value.

If the anchor be with a buoy, one-sixth of the value.

By foreign vessels:

If the anchor be without a buoy, one-half of the value.

If the anchor be with a buoy, one-third of the value.

The same to be estimated by surveyors named by the head-pilot and the master of the vessel.

Pilots shall not exact a greater sum than that mentioned in the tariff-rates drawn up in each port, under penalty of the restitution of the entire pilotage.

In cases of tempest and evident danger, an indemnity apart, fixed by the tribunal of commerce, according to the work done and the danger encountered, shall be paid to the pilot by the master.

DOCK CHARGES.

A circular issued by the French minister of marine establishes the following regulations, charges, &c., with regard to vessels admitted into government dry-docks for repairs;

	Francs.	Centimes.
Sailing-vessels, per ton :		
For the day of admission.....	0	80
For each day in dock, including the day of leaving...	0	40
Steamers, per ton :		
For the day of admission.....	1	00
For each day in dock, including the day of leaving...	0	50

The tonnage of sailing-vessels will be calculated according to their legal measurement; that of steam-vessels according to their legal measurement plus two-thirds. Vessels below 400 tons measurement will pay, at the least, on that amount. Sundays and fête days will not be charged for unless work be actually performed on those days. For sailing or steam vessels above 1,000 tons burden, the charges will be reduced by one-half for every ton beyond 1,000 tons, and by three-fourths for every ton beyond 1,500 tons. All costs for material and labor requisite for admission into dock, for pumping out the dock, for shoring the vessel and for clearing out, must be paid. Nevertheless the crew may be made available for these purposes if considered desirable.

Method of
gauging French
ships.

Moorson's system of gauging ships was introduced in France by the decree of May, 1873, and includes now all vessels of 500 tons and upward. In three more years it will include all vessels of the French mercantile navy. As far as sailing-vessels are concerned the new gauge presents no variation worthy of note, but steamers are subjected to an increase in their tonnage of from 30 to 60 per cent. This brings about an increase in the tonnage, dock, health-office, quay, light-house, and other dues, and places French steamers at a disadvantage compared with those of other nations.

EXTRACTS FROM CONVENTION, CONCLUDED FEBRUARY
23, 1853.

ARTICLE VIII.

Differences be-
tween masters
and crews.

The respective consuls-general, consuls, vice-consuls, or consular agents shall have exclusive charge of the internal order of the merchant-vessels of their nation, and shall alone

take cognizance of differences that may arise, either at sea or in port, between the captain, officers, and crew without exception, particularly in reference to the adjustment of wages and the execution of contracts. The local authorities shall not on any pretext interfere in these differences, but shall lend forcible aid to the consuls, when they may ask, to arrest and imprison all persons composing the crew whom they may deem it necessary to confine. Those persons shall be arrested at the sole request of the consuls, addressed in writing to the local authority and supported by an official extract from the register of the ship or the list of the crew, and shall be held, during the whole time of their stay in port, at the disposal of the consul. Their release shall be granted at the mere request of the consuls made in writing. The expenses of the arrest and detention of these persons shall be paid by the consuls.

ARTICLE IX.

The respective consuls-general, consuls, vice-consuls, or consular agents may arrest the officers, sailors, or all other persons making part of the crews of ships-of-war or merchant-vessels of their nation, who may be guilty or be accused of having deserted said ships and vessels, for the purpose of sending them on board or back to their country * * *; to that end the consuls of the United States in France * * * shall apply to any of the competent authorities, and make a request in writing for the deserters, supporting it by an exhibition of the registers of the vessel and list of crew, or by other official documents to show that the men whom they claim belonged to said crew. Upon such request alone thus supported, and without the exaction of any oath from the consuls, the deserters, not being citizens of the country where the demand is made either at the time of their shipping or of their arrival in port, shall be given up to them. All aid and protection shall be furnished them for the pursuit, seizure, and arrest of the deserters who shall even be put and kept in the prisons of the country, at the request and at the expense of the consuls, until those agents may find an opportunity of sending them away. If, however, such opportunity should not present

Deserters.

itself within the space of three months, counting from the day of the arrest, the deserters shall be set at liberty and shall not again be arrested for the same cause.

ARTICLE X.

Protests of
masters.

The respective consuls-general, consuls, vice consuls, and consular agents shall receive the declarations, protests, and reports of all captains of vessels of their nation in reference to injuries received at sea; they shall examine and take note of the stowage; and where there are no stipulations to the contrary between the owners, freighters, or insurers, they shall be charged with the repairs. If any inhabitants of the country in which the consuls reside, or citizens of a third nation, are interested in the matter and the parties cannot agree, the competent local authority shall decide.

ARTICLE XI.

Salvage.

All proceedings relative to the salvage of American vessels wrecked upon the French coast * * * shall be directed by the consul-general, consuls, and vice-consuls of the United States in France, * * * and, until their arrival, by the respective consular agents wherever such agency exists. In the places and ports where an agency does not exist, the local authorities, until the arrival of the consul in whose district the wreck may have occurred, and who shall be immediately informed of the occurrence, shall take all necessary measures for the protection of persons and the preservation of property. The local authorities shall not otherwise interfere than for the maintenance of order, the protection of the interest of the salvors if they do not belong to the crews of the vessels wrecked, and to carry into effect the arrangements made for the entry and exportation of the merchandise saved.

It is understood that such merchandise shall not be subjected to any custom-house duty if it is to be re-exported, and if it be entered for consumption a diminution of such duty shall be allowed in conformity with the regulations of the country.

QUARANTINE-LAWS.

Bill of health.

All vessels, excepting fishing-boats, revenue-boats, or coasters, entering French ports, must have a bill of health, in which will be stated the sanitary condition of the port of

departure and of the vessel at the time of departure, and of the passengers and crew.

If a vessel touch at any intermediate port between the ports of departure and destination, the bill of health must be viséd there, and a statement added respecting the sanitary condition of that place and of the vessel. In case of remaining over five days after the delivery or *visa* of the bill of health, whether in the port of departure or in any intermediate port, a new *visa* becomes necessary. Visa.

In the ports of France the bills of health are furnished by the sanitary authorities.

Although a bill of health is required of vessels coming from any port in the world, it is the custom not always to exact one of those coming from countries usually healthy. The custom is sanctioned by the peculiar wording of Art. 4, of the decree of December 24, 1850, which reads: "Any vessel unprovided with a bill of health, *which, by reason of its port of departure, should have one*, shall be kept apart for an examination into her sanitary condition, and, besides the measures to which she may be subjected to that end, may be compelled to perform a quarantine of observation for three to five days." Bill of health not required.

Vessels whose bills of health may have erasures, additions, or other alterations of a suspicious character, are subject to special supervision, and to such measures as may be deemed necessary, without prejudice to the prosecution of the captain or master, and, independently of them, of the authors of the said alterations. Alterations in bills of health.

It is forbidden to captains of vessels bound to French ports: 1. To part with their bill of health before reaching their port of destination. 2. To have on board any bill of health other than the one given in the port of departure. 3. To embark on board their vessels any stranger, sailor, or other person appearing to have any infectious disease.

The health-officer of a vessel, or, in his absence, the captain, must make note in the log of all cases of illness that may occur on board. The decree of August, 1822, also exacted a note of the symptoms of the malady, and although that of 1850 did not renew that requirement, it is generally demanded whenever there is a medical officer attached to the vessel. Note of sickness in ship's log.

Death on
board.

In case of death on board from any infectious disease, all effects used by the deceased, while sick, and that might communicate the infection, must be burned and destroyed, if the vessel be at anchor, and if under way, must be thrown overboard with due precautions against their floating. Also, all other effects of the deceased, or of persons that may have been attacked by the malady without succumbing, shall be fumigated, towed overboard, or subjected to some other efficient mode of disinfection.

Duties of ship-
masters.

On all ship-masters are imposed the following duties : to prevent all communication, on entering port, previous to being admitted to free pratique ; to conform to all rules and orders of the sanitary police ; to berth their vessels in the places designated to them ; to proceed in person, as soon as requested, to the presence of the sanitary authorities, flying a yellow flag in the boat, if quarantined, to warn others not to communicate with them ; to furnish the said authorities with all the ship's papers, and to answer on oath all questions asked, and to give all facts or information in their power that may interest the public health.

Members of the crews and passengers of vessels may be subjected to the same interrogatories.

Quarantine.

Vessels arriving in French ports are liable to be subjected either to a rigorous quarantine or to one of observation, both of which will be more or less long and strict according to the season, the place where such quarantine is performed, the objects more or less capable of retaining infection on board, and the length and other circumstances of the voyage.

According to the decree of 1822, vessels with clean bills of health, coming from countries not generally healthy, or that are known to be temporarily infected, will be subjected to a quarantine more or less rigorous, and of greater or less duration, according to circumstances.

Before being admitted to free pratique, vessels coming from healthy countries, with clean bills of health, must submit to the customary visits and interrogatories, and an examination of their bills of health. Accidents or communications of a suspicious character, will delay their being admitted to free pratique.

The length of the quarantine prescribed in any case may be increased for any vessel communicating with any other performing a more rigorous quarantine, or on board which symptoms of an infectious disease may appear, or if facts of a suspicious nature should come to the knowledge of the sanitary authorities. In the former case the additional quarantine imposed shall not exceed the remainder of the term still to be performed by the other vessel at the time of communication.

Vessels having to undergo observation, can remain in any French port during the time prescribed.

The quarantine stations are termed lazarettos, and comprise a portion of territory or an island, on which are erected buildings for the lodging of persons and storage of cargo, and a portion of a roadstead for the berthing of vessels.

Lazarettos.

Vessels performing quarantine must remain anchored, or moored to a pier, and can have no communication with the shore or among themselves. When the crew and passengers remain on board, they will receive everything necessary in the way of food, clothing, or assistance. On shore the sick are attended, the dead buried, and merchandise disinfected.

Merchandise and other objects deposited in the lazarettos, and not reclaimed within two years, are sold at public auction. If of a perishable nature, they may be sold before the expiration of the two years, by virtue of an order from the president of the tribunal of commerce, or, in his absence, of a justice of the peace. The price received goes to the state if not claimed within five years following the sale.

Sale of un-claimed goods.

Art. 2, of the decree of April, 1833, provides that cotton bales coming from the United States shall not be opened nor landed at the lazarettos, whatever sanitary measures it may be deemed necessary to take in regard to the vessel carrying them. This law has since been extended to include the West Indies.

American cotton.

The health officers of a port can refuse admission into quarantine, if the lazarettos be crowded, or suffering from or threatened with infection, or if the vessel be so infected as to endanger the public health by remaining. This refusal is to be accompanied with information as to the nearest ports where such vessel could be received.

Non-admittance to quarantine.

Destruction of
infected matter.

Art. 3 of the decree of March, 1822, says that when it is impossible to disinfect, preserve, or transport without danger, any animals or objects capable of transmitting infection, the former shall be killed and buried, and all other matter burned and destroyed, without having to refund their value to the owner. In these cases the owner is entitled to make what statements or give what arguments he may judge proper against the execution of the law.

Violation of
quarantine.

Any vessel or person that may attempt in violation of the law to enter into free pratique, after being once warned, shall be forcibly ejected without prejudice to prosecution.

MEASURES, WEIGHTS, AND COINS.

Length.

The unit of length in France is the metre, which was intended to represent the ten-millionth part of the distance from the equator to the pole, measured over the surface of the earth. It slightly varies from this, however, and can therefore be regarded only as a unit of length represented by a bar of platinum in Paris, measured at the temperature of melting ice, (0° centigrade, or 32° Fahrenheit.)

10,000 metres make 1 myriametre = 6.214 miles.

1,000 metres make 1 kilometre = 0.6214 mile.

100 metres make 1 hectometre = 328.09 feet.

10 metres make 1 decametre = 32.809 feet.

The metre = 39.37079 inches.

1 metre equals 10 decimetres; decimetre = 3.937079 inches.

1 metre equals 100 centimetres; centimetre = 0.3937 inch.

1 metre equals 1,000 millimetres; millimetre = 0.03937 inch.

Surface.

Squares of the metre and its derivatives are used to measure surfaces. Also the *are*, equal to a square of ten metres on a side.

100 ares, or 10,000 square metres, make 1 hectare = 2.4714 acres.

The are, or 100 square metres = 1,076.43 square feet.

The $\frac{1}{100}$ of an are, 1 square metre, is the centare = 1,550.06 square inches

Capacity.

The litre is the unit for both wet and dry measure, and equals one cubic decimetre.

10,000 litres make 1 myrialitre = 2641.8 United States gallons.

1,000 litres make 1 kilolitre = 264.18 United States gallons.

100 litres make 1 hectolitre = 26.418 United States gallons.

10 litres make 1 decalitre = 2.6418 United States gallons.

The litre = 1.05672 quarts, United States measure.

1 litre equals 10 decilitres; decilitre =0.211344 pint, U. S. measure.
1 litre equals 100 centilitres; centilitre =0.021134 pint, U. S. measure.
1 litre equals 1,000 millilitres; millilitre=0.002113 pint, U. S. measure.

In dry measure the kilolitre =28.3782 United States bushels; the hectolitre =2.83782 bushels; the decalitre =1.13513 pecks; the litre =0.227 half-peck, and so on. In measuring wood and coal the kilolitre is known as the stere, the myrialitre as the decastere, and the hectolitre as the decistere.

The standard of weight is the gramme, which represents the weight of one cubic centimetre of distilled water at its maximum density.

Weight.

- 1,000,000 grammes make 1 millier or tonneau = 2204.62 pounds.
- 100,000 grammes make 1 quintal = 220.462 pounds.
- 10,000 grammes make 1 myriagramme = 22.0462 pounds.
- 1,000 grammes make 1 kilogramme = 2.2046 pounds.
- 100 grammes make 1 hectogramme = 3.52739 ounces.
- 10 grammes make 1 decagramme = 0.35274 ounce.

The gramme equals 15.432349 grains.

- 1 gramme equals 10 decigrammes; decigramme = 1.543235 grains.
- 1 gramme equals 100 centigrammes; centigramme = 0.15432 grain.
- 1 gramme equals 1,000 milligrammes; milligramme = 0.01543 grain.

Ten centimes make 1 décime; 10 décimes make 1 franc. The theoretical value of the franc in United States money is \$0.1945. The value recognized in United States custom rates is \$0.193.

Money.

Coin table.

Coins.	Material.	Weight, (grains.)	Fineness.	Value.
100-franc piece, legal rate	Gold	497. 742	900	\$19. 2955
50-franc piece, legal rate	Gold	248. 871	900	9. 6478
20-franc piece, legal rate	Gold	99. 548	900	3. 8591
20-franc piece, by U. S. Mint assay ..	Gold	99. 360	899	3. 8470
10-franc piece, legal rate	Gold	49. 774	900	1. 9296
5-franc piece, legal rate	Gold	24. 887	900	0. 9648
Louis d'or, 1785	Gold ....	.....	.....	4. 6604
Louis d'or, 1810 to 1840	Gold ....	.....	.....	3. 8258
5-franc piece, legal rate	Silver ...	385. 750	900	0. 9726
5-franc piece, U. S. Mint assay	Silver ..	384. 000	900	0. 9600
2-franc piece, legal rate	Silver ...	154. 320	835	0. 3890
2-franc piece, 1867-'68, by U. S. Mint assay	Silver ...	153. 600	835	0. 3560
Franc, weight 5 grammes, legal rate	Silver ...	77. 160	835	0. 1945
Piece of 50 centimes, legal rate	Silver ...	38. 580	835	0. 0972
Piece of 20 centimes, legal rate	Silver ...	15. 432	835	0. 0389
Piece of 10 centimes, legal rate	Bronze ..	154. 320	.....	0. 0195
Piece of 5 centimes, legal rate	Bronze ..	77. 160	.....	0. 0097
Piece of 2 centimes, legal rate	Bronze ..	30. 864	.....	0. 0039
¼ Piece of 1 centime, legal rate	Bronze ..	15. 432	.....	0. 00195

Of the bronze coins given in the above table, the weight of each one is represented in grammes by the number of centimes, 10 centimes weighing 10 grammes, and so on downward.

ALPHABETICAL INDEX OF NAMES.

A.	Page.
Achurí point	151
Adour river	195, 196, 200
— lights	196
Aguillonnes cape	8
Ahorcado point	118
Aigle, Basse de l'	291
Aiguille point	265
Aiguillon point (Pert. d'Antioche)	263
— light (Pert. d'Antioche)	263
— bay (Pert. d'Antioche)	263, 274
— light (Loire river)	306
Aix island light	240
— — roads	250, 251
Ajo river, cape	110
Allé point	155
Alzacoarría bay	155
Amuck islet	170
Auchise river	210
Ano, Mount	114
Antioche, Pertuis d'	247, 248
— — approaching	244-247
— Rocher d'	239
Anzaron Island	23
Anzora point, village	142
Apiquel point	143
Aquech islet	138
Arando Grande point	164
— Chico point	164
Arcachon, Bassin d'	206-208
Ardevenne point	361
Areoura point	30
Argenton port	466
Armenza bay, village	137
Arnao bay	35
Arno mount	150
Arnosate monnt	150
Arrangasía point	150
Arredo bank	35

	Page.
Arriedera islet	141
Arruicobajá point	158
Artedo bay	48
Artha, rock	192
Artimon, Plateau de l'	337
Arvert point	235
Arzie port	340
Asabaratza bay	170
Astrolabe, Basse de l'	308
Audierne bay	409, 410
— town	410, 412
— lights	411
— channels, roads	411, 412
Auray	356
Aven river, light	380
Avilés inlet	52
— light	53
— town, directions	54

B.

Balanec island	474
Baleines point	241
— light	242
— Conches des	269
Baleineaux light	242
Ballota point (near Llanes)	81
Ballota (Negra) point (near Suan- ces)	93
Bancha, bank	159
Banche, la, bank	307
— light	308
Bandeja point	10
Bannec island	474
Báquio bay	137
Barges d'Olonne	265
— — light	265
— — approaching	276
— — passes	276, 277
Barillets, les, rocks	418

	Page.		Page.
Barquero inlet.....	12	Bœufs, Chaussée des	293, 294
— port	13	Bordeaux	230-236
— tides, directions	16	Bonneau rock.....	288
Barqueta (Meron) bay.....	69	Borizo island	79
Basorda bay.....	137	Bossemen, les	467
Basques roads	249, 250	Boufoulloc, le.....	469
Bastresses, les, shoals.....	368	Bourgneuf bay.....	297-303
Batallera mount	162	Brest roads.....	445-451
Bauzec, basse.....	333	— lights.....	446
Bavard rock.....	294	— city	456-459
Bayonne	201, 202	— directions	451-456
Begoña point, town.....	128	Bridy, basse.....	477
Beg-Morg point.....	379	Brigneau inlet.....	379
Belle-Ile	337-342	Brusco point.....	111
— light	338	Burela point.....	28
— channel	342-344	Busto cape, light.....	46
— directions.....	343		
Bélon river, light.....	380		C.
Belveignou, les, shoals	470	Caballo point (near Vivero).....	19
Beniguet, Chaussée du (Quiberon bay)	335	Caballo point (near Santander)..	101
— pass (Quiberon bay).....	352	Caballo point (near Llanes).....	80
Béniguet island (near Ouessant). ..	470	Cabarga mount.....	106
Béninou bay.....	478	Cabellou point.....	382
Benodet bay.....	391-396, 398	— Linuen du.....	390
— town	398	Cabrero point.....	90
Bermeo port.....	139	Cabrito point.....	62
Berria sands.....	111	Calderon point.....	93
Bertheaume bay.....	443	Camaret bay	437
Besaya river.....	95	— town	438
Beuzec, basse.....	445	Candás bay, port	63
Beuzec, light.....	383	Candina mount	118
Biarritz point, town.....	194	Cantin, basse	284
— light.....	195	Canto point	94
Bidart.....	194	Cantos anchorage.....	95
Bidasoa river	173	Cap Breton, fosse de.....	203, 204
Bidio cape.....	47	— — light.....	205
Bilbao bay.....	122, 127, 128	Capucins point.....	438
— town	131, 132	— light	439
— lights.....	133	Carabela bank.....	34
Biron rocks.....	288	Cardal point.....	149
Bivideaux, plateau des.....	342	Cariño inlet	8
Biscarosse beacon.....	206	Carrande mount	73
Biscarraya point	153	Carrastrado point.....	90
Biscay province.....	123	Carreros point	73
Blanche, la, bank.....	296	Castelli point	328, 329
Blanco, cape.....	40	Castonillet, basse	309
Blancs Sablons, bay.....	464	Castro bank	38
Blaye	230	Castro-Urdiales bay, port.....	120, 121
		— — light.....	121

INDEX OF NAMES.

521

	Page.		Page.
Castro Verde bank.....	121	Concarneau, directions.....	388-390
Castropol.....	34	—— town, roads.....	390
Cavada peak....	105	Conejera island, light.....	15
Cerredo mount.....	119	Conejos island	97
Cervignon point	68	Conquet, le, town.....	464
Chacineiras islets.....	30	—— ——— light.....	464
Chaise, la, bank.....	303	Contis light.....	206
—— light	296	Corbeau point.....	281, 282
Chapelle, Haut-Fond de la.....	483	—— ——— light.....	282
Charente river.....	252-256, 257	Cordouan light.....	214
—— lights.....	240	Cornoc Bras	414
Charniers point.....	295	Corsen point.....	464
Charn, basse ar.....	413	Cortada point.....	100
Charpentiers banks	305	Corvic, le.....	382
Chassiron point, light	239	Cotinière, la	239
Château, le, town (Oléron island).....	238	Coubre, la, point, light.....	213
—— ——— lights (Oléron island)..	240	Courleau, basse.....	467
Châteaulin roads.....	460, 461	Couronnée, la, basse.....	297
—— river	462	Crac'h lights.....	333
—— town	462	—— river.....	359
Chatelaillon point	241	Créac'hmeur point	443
Chats, pont des.....	417	Créac'h light	476
Chauveau point.....	258	Croisie point.....	308
—— light	242	—— lights.....	309
Cheminées, les	468	—— town, roads.....	328
Chémoulin point.....	307	Croix, la, light (Concarneau)....	383
Chenal, basse du (off Lorient bay).....	372	Croix, la, light (Ile de Groix)....	364
Chenal, basse du (off St. Matthieu point).....	463	Croix-de-Vie river.....	290
Chevaux, chaussée des (Noirmou- tier).....	295	Crom, le.....	479
Chevaux, chaussée de l'Ile aux...	335	Cromic, le.....	472
—— passes	352	Cruz point.....	35
Chèvre, port (Haedik island)....	354	Cudillero port, light	48
Chèvre, la, cape (Douarnenez bay).....	428	Cuerno point	97
—— chaussée (Douarnenez bay) .	428	Cuerno de Candás point.....	62
Chiens Perrins, les.....	283	Cueva Baja point	15
Chiquet point.....	264		
Cillerø town.....	20	D.	
Ciérvana point.....	127	Darland port	478
Cleu basseven	474	Demetria island.....	97
Có bank.....	22	Deva islet.....	51
Coelleira channel.....	15	—— inlet.....	150
Cogollo point.....	51	—— river.....	84
Colunga river.....	73	Devin point.....	293
Combrit point	392, 397	Dichoso point.....	93
Comillas port, light	90	Dinant point	431
Commerce light	306	—— bay.....	432
Concarneau lights.....	382, 383	Doble bank.....	111
		Donon bay..	338
		Dordogne river.....	212

	Page.		Page.
Douarnenez bay	427-431	Fromveur channel.....	480
— town	429	Front, roche du	285
Douélan port, lights.....	379	Fuenterrabia bay.....	171, 172
Drevantec pass.....	353	— town.....	172
Dumet island.....	329	Furado, mount.....	14
— passage.....	329		
		G.	
E.		Gabeira islet.....	18
Echelle point.....	339	Galea point.....	128
Enizan rock.....	400	Galera point.....	157
Entornada point.....	69	Galizano, cape.....	109
Erbosa isle.....	57	— river, town.....	110
Ervilly l, point.....	410	Gardette, la, point	295
Escairo point.....	31	Garfanto point.....	111
Esclassiers pass.....	351	Garonne river.....	212
Esconil port.....	400	Gasteatape bay	153
Espasante bay, village.....	10	Gironde river.....	212
Esquilletac, les.....	190	— — lights	213-216
Estaca point, light.....	10, 11	— — tides.....	216, 217
Etel river, light.....	362	— — soundings off.....	218, 219
Eve l, point light.....	306	— — Passe du Nord.....	220-224
		— — Passe des Charentais...	224
F.		— — Passe du Sud.....	224-226
Fain, le.....	301	— — anchorages	227, 228
Farallones de San Cipriano.....	25	— — interior navigation	229
Faro, Mount.....	20	Glénans islands.....	383-385
Ferret, cape-light.....	207	Goayen river	410
Fief d' Ars.....	269	Gorliz sands	136
Fief point lights	242	Goulet de Brest.....	439, 440
Fillettes, les.....	441	— dangers.....	440-442
Florus, Raz du.....	479	Goulfar port	338
Forcada point.....	55	Grallal beach	19
Forest, la, bay	383, 391	Grand Banc light-ship.....	213
Forno anchorage.....	50	Grand Champ rock.....	283
Four, le, rock, light (near Melgorne point)	466	Grand Minou point	443
— channel, (near Melgorne point).....	486-488	Grand Mont point.....	332
Four, le, rock, light (Loire river)	309	Grand Gouin point.....	437
— passage, (Loire river).....	345, 346	Grande Vinotière, la	463
Fournier, basse.....	310	Grave point lights	213
Foz, gulf	28	Grazu rock	368
— inlet.....	31	Groix, Ile de.....	363, 364
Fraile point.....	112	— — light.....	364
— anchorage.. ..	117	— — anchorage.....	365
Frio mount.....	158	— — approaching.....	369-371
Fromantine inlet.....	291, 292	Grouin du Cou point, light	264
Fromveur, basse.....	478	Guarnizo village	104
		Guérande bank	309
		Guérin, basse	310
		Guérinière, anse de la.....	293

	Page.		Page.
Guetaria, bay	153	Jaune, basse	381
— town, light	154	Jument, la, point	382
Guilvinec port, lights	401	— Corven de la	382, 390
Guinoec, basse	390	Jument, la	471
Gijon bay	64		
— town	65		
— lights	66		
		K.	
H.		Karek-Allidec	390
Haedik island, light	336	Karek-Bras	380
— roads	354	Karek-Gréiz	400
Halguen point	329	Keller, chaussée de	479
Helle, plateau de la	473	— island	479
— chenal de la	488	Kerbel bay	373
Hélorète, pass	417	— light	366
Hennebont	377	Kerdonis point	340
Herbaudière l', point	293	Kerel, port	339
Hermitage, rocher de l'	430	Kermorvan point	463
Hernio mount	157	Kersos bay	382
Higuera cape	170	Kervoyal point	330
— light	171	Kérouars, banc des	298
Hikérik, basse	309	Koguès, basse	386
Houat island, bank	335		
— — anchorage	352	L.	
Hourtin lights	210	La Conche anchorage	285
Haut Banc du Nord light	242	La Flotte light	242
Haut-Fond d' Ouessant	479	— anchorage	272, 273
Haut-Fond de la Chapelle	483	La Grigne, beacon	210
Huchette beacon	206	La Lastra point	119
		La Longe le Boyard bank	251
I.		La Molar rock	89
Igueldo mount	157	La Plata, cape	164, 168
Iliss, basse an	379	La Rochelle, lights	241
Iock, ile d'	466	— — city	261, 262
Iroise	431	— — anchorage	259
— dangers	433, 434	— — roads	260
— passes among rocks	435-437	— — approaching	258-260
— soundings	451	La Sablaire anchorage	284
Irun	172	— — bank	285
Isaro inlet	141	La Tranche point, (Ile d'Yeu)	286
Islares point	118	La Tranche village, (Pertuis Bre-	
Itegui point	155	ton)	264
Itzarritz mount	157	Laberildut	464
Izustarri point	153	Lage bank	22
		Laisuas rocks	140
J.		Lambarde bank	308
Jaisquivel mount	170	Lamiaran point	140
Jardinets, les	305	Lampaul bay	476
Jarri point	79	Landévennec channel	462
		Landerneau river	459, 460
		— town	459

	Page.		Page.
Moréa point	90	Otoyo mount	144
Morées bank	305	Ouessant island	475-479
Morgat point, anchorage	428	— — lights	476, 478
Morgoa point	140	— — landfall	481-485
Morgol islet	472	Ours des Vieilles	286
Motrico port	150	Oyarzun river	165
Mousterlin point	391	Oyhambre cape	89
Moutons island	385		
— channels	386, 387	P.	
Mundaca river	140	Paille, basse	368
— town	141	Paimbœuf light	305
Muzquiz point	126	— town	323, 324
		— anchorage	324
N.		Pain Château point	307
Nachitúa point	143	Palais, le, town, roads	340, 343
Nantes	324-328	— light, shoal	341
Navalo light	333	Palliee anchorage	258, 273
— anchorage	358	Palo Verde island	76
Navía inlet	42	Panella islet, light	33
Negro point	56	Paraños beach	24
Nervion river	129	Pasages port	164
Netos islets	22	— town	165
Niembro inlet, village	78	— lights	167
Ninkinous, les	413	Pauillac	230
Nivelle river	190	Peehon point, beach	85
Noirmoutier island	293	Pellerezo point	85
— town, light	296	Pen-ar Roc'h	477
Noja bay	111	Penerf port	331, 332
Notre Dame, basse	293	Penfeld river	456
Nuestra Señora de las Nieves, mount	117	Penfret light	384
Nueva river	76	Penhir point, bay	432
		Penlan point, light	330
O.		Penmarc'h rocks	403
Odet river, lights	392	— point, light	404
Ogoño mount, cape	142	— — approaching	405, 406
Oguella bay	144	Penthièvre fort	361
Olaviaga	131	Penvins point	330
Oléron island	238	Peña Castillo	104
— — lights	239, 240	Peña Mayor island	86
Olive point	69	— Menor islet	86
Ondárroa bay	146	Peñas cape	56
Orgullo (Urgull) mount	158	— — light	57
Oriñon point, inlet	118, 119	Pequechilla rock	164
Orio inlet, river, town	156	Peran point	63
Orrio de Tapia	39	Pères, basse des	296
Orruaga bay	152	Perray, point, river	264
Ortegal cape	7	Perroche, la	239
Oteiro bay	47	Perrotine light	240
		Pertuis d'Antioche	247, 248

	Page.		Page.
Pertuis d'Antioche, approaching.	244-247	Portz-Guen (Quiberon).....	360
Pertuis Breton.....	265, 267	Portz-Guen (Ouessant).....	477
— — approaching.....	266	Portzen point.....	432
Pertuis de Maumusson.....	236-238	Portzie light.....	440
Petite Foule light.....	282	Portzpoder bay.....	466
Petit Minou light.....	439	Potorroarri point.....	138
Petit Taureau.....	470	Poulains, les, point.....	337
Peton bank.....	46	— — rocks, light.....	338
Peu Breton.....	273	Poulbrien.....	407, 408
Piedra de Burela.....	30	Pouldon anchorage.....	339
Piedras Blancas (Achurí) point..	151	Pouldu bay.....	378
Piedras Meas.....	10	Pouliguen light.....	307
Pierre des Poissons.....	469	Pourceaux, les.....	385
Pierre du chenal.....	298	Právia river.....	49
Pierre Moine.....	298	Préau bank, anchorage.....	271, 272
Pierre Percée.....	307	Pricto cape.....	71
Pierres Noires (Etel river).....	361	Promontory point.....	102
Pierres Noires, light (near Oues- sant).....	468	Puerto point.....	102
Pierres Vertes.....	474	Puntal del Pasage point.....	114
Pilier island, light.....	295		
Pilours rock.....	289	Q.	
Piñeira point.....	32	Quebrantas point.....	105
Piriac, plateau.....	329	Quejo cape.....	110
Pirion, basses.....	413	Quéménès island.....	472
Pitorro bank.....	115	Quiberon peninsula.....	334
Placen-ar-Béniguet.....	469	— bay.....	333, 354, 355
Plâtresses, les.....	467	— — lights.....	333, 334
Plénia inlet.....	136	— — entering.....	350
Plomb point, bay.....	263	Quimper river.....	396, 397
Pont l' Abbé river.....	399	— town.....	398
— town.....	400	Quimperlé river.....	378
Póo bay.....	79	Quintres cape.....	110
Porcia.....	39		
Pornic, light.....	297	R.	
Poreac, basse.....	379	Rabanal point.....	119
Port-Breton.....	284	Rabía bay, beach.....	89
— lights.....	282	Raguenès rock.....	381
Port de la Mule.....	286	Ranvel, le.....	469
Port-Haliguen.....	359	Raoulic point, light.....	411
— light.....	334	Rastrillar point.....	118
Port-Louis lights.....	366	Raz, Bec du.....	414
— roads.....	371	— —, lights.....	415
— entering.....	371-373	Ré island.....	241
Port-Maria.....	360	— — lights.....	242
Portelo.....	28	Recherche, plateau.....	336
Portes, banc des.....	269	Redon.....	349
Portugalcte.....	129	Remedios point.....	91
Portz-Carn.....	408	Renards, les.....	463
		Rennes.....	349

	Page.		Page.
Repos rocks	288	Saint-Nazaire lights....	306
Requejada village.....	94	—— — roads	320
Requexo point.....	52	—— — town.....	322, 323
Rivadeo inlet.....	33	Saint-Nicolas point (Sables	
—— town	34	d'Olonne).....	275
—— pilots, directions	36	Saint-Nicolas bay (Douarnenez)..	429
Rivadesella inlet, town.....	74	Saint-Philibert river.....	359
—— light	75	Sainte-Barbe point, light.....	190, 191
Roche Bernard.....	349	Saja river.....	95
Rochebonne plateau.....	243	Salto Caballo point	122
—— light-ship.....	242	San Agustín cape	41
—— soundings W. of.....	266	San Antolin beach, river....	77
Rochefort port.....	256	San Anton island.....	153
—— city	256, 257	San Antonio point..	80
Rodiles point.....	72	San Carlos point.....	113
Romanellas, las.....	44	San Cipriano bay	23
Rosa point.....	140	—— — beach	25
Rosmenr light	430	—— — port, river.....	26
Rospects, les.....	444	—— — light, directions....	27
Royale, basse	468	San Clemente reefs.....	26
Royan.....	230	San Estéban port	50
Ruiloba point.....	92	San Ignacio point.....	128
S.		San Juan bay	19
Sabiote river	123	San Juan del Canal bay	99
Sablanceaux point	241	San Lorenzo point	68
Sables d'Olonne town.....	280	San Martin point.....	103
—— — port.....	274	San Martin de la Arena (Suances)	
—— — harbor.....	279, 280	inlet.....	94
—— — passes to.....	276-279	San Martin de la Arena, direc-	
—— — approaching.....	275, 276	tions.....	96
—— — roads	275	San Nicolain mount.....	149
—— — lights.....	264, 265	—— — point.....	150
Saiñas point.....	22	San Nicolas island	145
Saint-Clément point	263	San Pedro bay	47
Saint-Gildas point.....	299	—— — point.....	80
Saint-Gilles-sur-Vie light.....	289	San Pedro del Mar inlet....	99
Saint-Jean de Luz plateau.....	186-189	—— — rock.....	99
—— — bay.....	189, 190	San Sebastian cape	38
—— — town	194	San Sebastian bay.....	159
—— — lights.....	190	—— — port, town.....	160
—— — anchorage.....	193	—— — lights	161
Saint-Laurent point.....	273	San Telmo point.....	152
Saint-Marc point.....	241	San Vicente de la Barquera har-	
Saint-Martin light (Ré island)...	242	bor.....	86
—— — roads (Ré island).....	270	—— — town	87
—— — port (Ré island).....	271	—— — light, tides.....	88
—— — point (near the Adour).....	195	Santa point.....	13
Saint-Matthieu point, light.....	444	Santa Anna (Sainte-Anne) point.	171
		Santa Catalina point.....	151

	Page.		Page.
Santa Catalina de Lequeitio point.....	144	Sor river	14
— — — de Mundaca point	140	Soulac beacon	211
Santa Clara island.....	158	Souris rock.....	355
Santa Clara point.....	146	Stiff, le, light.....	478
Santa Clara point.....	81	— bay	478
Santa Gadiá point.....	38	Suances light.....	95
Santa Marina island.....	105	— islands	97
Santa Marta port.....	9	Succinio bay.....	332
Santander inlet.....	101		
— city.....	103	T.	
— lights.....	106	Taillefer point.....	341
— directions	108	— banks	342, 344
Santoña mount	112	Talayero point.....	163
— inlet.....	113	Taliferne point	407
— lights.....	113	Talut point, (Lorient)	368
— town, port	113	Tapia islet, light.....	39
Santurce village.....	127	Tas de Pois	432
Santurrarán point.....	149	Tazones point, bay.....	70
Sardinero bay.....	101	Teignouse la, light.....	334
Saumonars roads	251	— pass.....	350, 351
Sausaten bay.....	146	Tendoc le....	465
Sanzey, basse.....	284	Tevennec le, islet	417
Sauzon town, light.....	341	— light	418
Sécés, les (Noirmoutier I.).....	295	Teviec islet.....	361
Sein, Ile de.....	416	Tierra Blanca point.....	156
— — — light.....	416	Tina Mayor.....	82
— Pont de.....	417	— del Oeste or Santiuste.....	82
— Raz de.....	423-427	— light	84
— chaussée de.....	416	— Menor.....	85
— — — approaching.....	418-423	Tonnay-charente	257
Serrantes mount.....	127	Torbas bay.....	41
Serron bank.....	46	Torchc, la, point.....	409
Serropio bank.....	76	Torres, cape	64
Serroux, les.....	474	Torriente bank	92
Seudre river.....	237	Toulinguet point	432
Sevallo (Agnjero) point	127	— light	433
Siège, la, rocks.....	469	Trépassés bay	415
— passage.....	468	Trévignon point	380
Sismondi village.....	9	— corven de.....	381
Sizun, cap.....	413	Triélen island	473
Sobrepuesta point.....	13	Tristan island, light	429
Socastro point	18	Trois Pierres	369
Socoa light, town, port	191	Trousses roads.....	252
Sœurs, passage, (Houat I.)	336, 353	Trousyard pass	417
Sœurs, rock, (W. of Lorient)	378	Truies bank, (Lorient).....	368
Somocueva, (Liencres,) point.....	98	Truie, la, rock (Loire).....	305
Somonte point.....	28	Ture, basse.....	308
Somorrostro bay.....	126	— rock, light.....	308
Somosllungo bank	58	Turrulla point.....	170

	Page.		Page.
U.			
Uguerre point.....	138	Vigie, basse de la	291
Urdaburu mount.....	161	Vilaine river.....	330, 347-349
Urgull, (Orgullo,) mount.....	158	—— — approaching.....	345
Urola river	152	Villano point.....	137
Urumea river.....	163	Villarinea point	31
V.		Villaviciosa light	70
Vaca rock	78	—— town	71
Valbelle, la.....	465	Ville-és-Martin light.....	306
Vale, port	14	Vivero, port	18
Van, point	415	—— town	19
Vannes.....	355	—— resources, tides, directions..	21
Vares cape	12	—— marks	22
—— bay, anchorages.....	13	W.	
Vega, port.....	43	Wibbine	408
Vendays, beacon.....	211	Y.	
Vermeuou, basse.....	265	Yeu, ile d'.....	281, 282
Vert, roches du	305	—— — lights.....	282
Verte, ile.....	380	—— — approaching	283
Viaveles, port	40	—— Pont d'	287
Vidiago point, village.....	81	Z.	
Vieille, basse (Douaruenéz).....	428	Zaranz bay, town.....	155
Vicilles, anse des, (Ile d'Yeu)....	286	Zumaya inlet, town, light	152
Vieille Noire.....	473	Zurriola bay.....	163
Vieux Château bay.....	287		





FEB 83

N. MANCHESTER,
INDIANA 46962



LIBRARY OF CONGRESS



0 017 570 014 6

